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Environmental Impact Statement
Sewanee, Tennessee Wastewater Facilities

(U.S.) Environmental Protection Agency
Atlanta, GA

Apr 82

U.S. Department of Commerce
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United States
Environmental Protection
Agency

Region 4
345 Courtland Street, NE
Atlanta GA 30365

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Environmental Impact Statement

Final

Sewanee, Tennessee Wastewater Facilities

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The Final EIS addresses proposed wastewater facilities for the Town of Sewanee, the University of the South, and the surrounding areas of Franklin County, TN. Seven wastewater management alternatives have been evaluated with particular attention to the protection of area surface water and groundwater resources. The proposed action of the Final EIS includes replacing the existing surface water discharge of wastewater with a land application system.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

APR 23 1982

TO: ALL INTERESTED AGENCIES, PUBLIC GROUPS AND CITIZENS

Enclosed for your review and comment is the Final Environmental Impact Statement (EIS) for proposed wastewater facilities for the Town of Sewanee, the University of the South and the surrounding areas of Franklin County, Tennessee.

This EIS was prepared in compliance with the National Environmental Policy Act and implementing Agency regulations (40 CFR Part 6, November 6, 1979). In accordance with these regulations, the Final EIS will be filed with EPA's Office of Federal Activities. Availability of the EIS will then be announced in the Federal Register, beginning a 30-day comment period. This Agency will take no administrative action on this project until the close of the comment period.

We will appreciate your review of this document and any comments you may have. Please send all comments to John E. Hagan III, P.E., Chief, Environmental Assessment Branch at the above address.

Final

Environmental Impact Statement

for

Sewanee, Tennessee

Prepared by

United States Environmental Protection Agency

Region IV, Atlanta, Georgia 30365

This Final EIS addresses proposed wastewater facilities for the Town of Sewanee, the University of the South, and the surrounding areas of Franklin County, Tennessee. Seven wastewater management alternatives have been evaluated with particular attention to the protection of area surface water and groundwater resources. The proposed action of the Final EIS includes replacing the existing surface water discharge of wastewater with a land application system.

Comments or inquiries should be forwarded to:

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Approved by:

Charles R. Jeter
Charles R. Jeter
Regional Administrator

March 8, 1982
Date

EXECUTIVE SUMMARY FOR ENVIRONMENTAL IMPACT STATEMENT

SEWANEE WASTEWATER FACILITIES

SEWANEE, TENNESSEE

DRAFT ( ) FINAL (X)

Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Type of Action: Administrative Action (X)
Legislative Action ( )

EXECUTIVE SUMMARY

PART A. EXISTING PROBLEM

1. STUDY AREA SETTING

The Sewanee Environmental Impact Statement study area is located in Franklin County in Southcentral Tennessee. The study area is set in the northeastern corner of Franklin County along the western face of the Cumberland Plateau. The study area is approximately 81 miles southeast of Nashville and 44 miles northwest of Chattanooga. The county seat of Winchester lies 11 miles to the west of Sewanee. The community of Sewanee is bisected by U.S. highways 64 and 56 and lies just west of Interstate Highway 24, a major transportation artery connecting Nashville to Chattanooga.

The study area is unique in that much of the area under consideration in the EIS is located within the 10,000 acre Domain of the University of the South. The community of Sewanee is located completely within the Domain of the University of the South. As the owner of all the land on which the community is located, the University is responsible for much of the administration, operation, and maintenance of the community. Land within the Domain may not be purchased but is leased on a long-term basis. The careful control of the community by the University has provided for the development of a community which is picturesque and blends easily with the surrounding woodlands of the area.

The EIS study area centers around the community of Sewanee, but its boundaries are not as clearly defined as those in the Sewanee 201

Wastewater Facilities Plan. The elasticity of the EIS study area boundaries results from the need to assess the far reaching impacts of the Sewanee sewage treatment plant and its alternatives many miles downstream of the study area.

2. DESCRIPTION OF THE EXISTING PROBLEM

The Sewanee EIS was initiated in October, 1977 to address the provision of wastewater facilities for the town of Sewanee, the University of the South, and the surrounding areas of Franklin County. The wastewater treatment plant operated by the Sewanee Utility District has been in operation since 1952 and is in serious need of upgrading to meet existing water quality criteria. The Sewanee STP currently discharges to Depot Branch of Lost Creek and ultimately to Big Sink and the Peters-Buggy Top Cave System.

In 1976, the Sewanee Utility District prepared a 201 Facilities Plan. Sometime prior to or concurrent with this study EPA, through the State of Tennessee, issued an NPDES (National Pollutant Discharge Elimination System) permit to the Sewanee Utility District outlining certain effluent limitation and monitoring requirements. All of the requirements set forth in this permit are standard to the area receiving streams with the exception of the nitrate-nitrogen standard. This standard was set at a monthly and weekly average of 10.0 mg/l.

The alternative recommended in the 201 Facilities Plan proposed construction of a new treatment plant and monitoring of the plant's discharge to determine if additional treatment would be required. However, this treatment and discharge alternative did not meet the nitrogen requirements set by EPA. Consequently, the 201 Facilities Plan was not approved.

EPA's primary concern in issuing the rigid nitrogen standard was the protection of drinking waters in the downstream Crow Creek Basin. The high degree of protection offered by the 10.0 mg/l standard was proposed by EPA as a result of concern for residents in the Sherwood area located approximately 10 miles south of Sewanee on Route 56 who receive their potable water from wells and springs. Consequently, the quality of the discharge into Depot Branch was raised as a major issue and served as a focal point for the conduct of the EIS.

Additionally, the stringent discharge standards had been required because of attempts to coordinate water quality levels in Lost Creek which would be consistent with the pending designation of the Lost Cave - Buggy Top Cave area as a wilderness area by the State of Tennessee and an interest in examining the influence of improved stream quality on aquatic species which have been intolerant to sewage flows in the past and to determine the likelihood that these species would return to Lost Creek.

The nitrogen standard issue was complicated by two conflicting matters. First, the Sewanee Utility District maintained that to meet the nitrogen standard, exorbitant user fees would be inflicted upon the users of the Sewanee wastewater system. Consequently, in the 201 Plan, the District recommended a treatment system that would meet Tennessee water quality criteria except for the nitrogen standard imposed by EPA. Additionally, the Utility District was concerned about the complexity and costs of operating and maintaining a treatment plant capable of meeting the rigid nitrogen removal requirements.

Further complicating the matter was the existing and proposed expanded use of the Carter Natural Area also located downstream of the STP. Odors and turbid, polluted waters have reportedly distracted from the recreational enjoyment of this site.

During the course of the EIS, two water quality sampling programs were conducted to establish existing conditions in the study area. These were conducted in December 1977 and April 1978. The results point to a lack of evidence that ground and surface waters in the inhabited areas near Sherwood are adversely impacted by the upstream discharge of the Sewanee Utility District wastewater treatment plant effluent. An additional sampling program was conducted in October 1978 to improve the data base and to aid in making a decision on the effluent limitations, particularly for nitrate-nitrogen.

Based upon the water quality sampling results, it was decided by EPA in February 1979 that a nitrate-nitrogen limitation was not appropriate. The alternatives developed and presented in this EIS are based upon these newly issued effluent limitations shown in Table S-1.

In summary, the EIS is the mechanism through which: (1) the strict effluent limits have been re-examined, (2) the impact of wastewater discharges on downstream water quality and water uses have been documented and (3) wastewater management alternatives, including the 201 Plan alternative and land application have been evaluated.

PART B. DESCRIPTION OF ALTERNATIVES

1. ALTERNATIVES IDENTIFICATION

Seven wastewater management alternatives have been evaluated in the EIS. At this point, the major difference in the alternatives is in the effluent disposal method. The three remaining disposal options include: (1) advanced secondary treatment (AST) discharge at the existing discharge point in Depot Branch, (2) secondary treatment discharge to the Elk River or (3) land application.

A schematic illustration of each of the seven alternatives is presented in Figure S-1. The alternatives are described below:

TABLE S-1

EFFLUENT LIMITATIONS FOR THE SEWANEE PLANNING AREA (1)

Parameter	Receiving Stream Treatment Level	Depot Branch I	Boiling Fork Crow, and West Fork of Battle Creek I	Elk River II
Flow (MGD)		0.43	0.43	0.43
BOD_5 (mg/l)		10	10	30
NH_3-N (mg/l)		2.0/5.0 (summer/winter)	5.0	—
D.O. (mg/l)		5.0	5.0	1.0
Suspended Solids (mg/l)(2)		15.0	15.0	30.0
Settleable Solids (mg/l)(2)		0.1	0.1	1.0
Chlorine Residual (mg/l)(2)		0.1	0.1	2.0
Fecal Coliform (per 100ml)		200	200	200

(1)

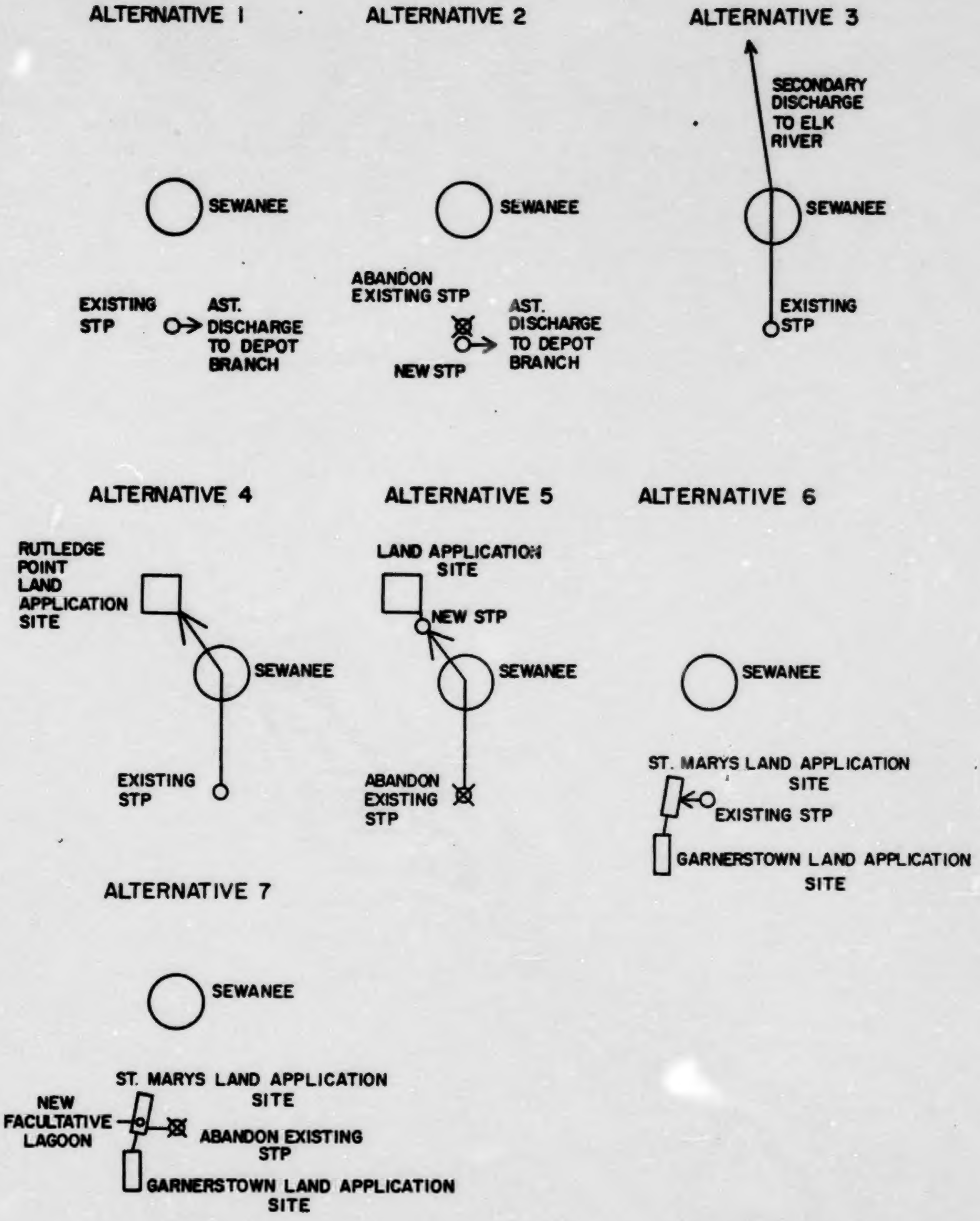
Effluent limitations set by the Tennessee State Department of Public Health Division of Water Quality Control and approved by EPA, except as noted.

(2)

Set by the Tennessee State Department of Public Health, Division of Water Quality Control, but not by EPA.

FIGURE S-1

SEWANEE, TENNESSEE EIS ALTERNATIVES


ALTERNATIVE 1
SEWANEE
EXISTING STP
AST. DISCHARGE TO DEPOT BRANCH
ALTERNATIVE 2
SEWANEE
ABANDON EXISTING STP
NEW STP
AST. DISCHARGE TO DEPOT BRANCH
ALTERNATIVE 3
SECONDARY DISCHARGE TO ELK RIVER
SEWANEE
EXISTING STP
ALTERNATIVE 4
RUTLEDGE POINT LAND APPLICATION SITE
SEWANEE
EXISTING STP
ALTERNATIVE 5
LAND APPLICATION SITE
NEW STP
SEWANEE
ABANDON EXISTING STP
ALTERNATIVE 6
SEWANEE
ST. MARYS LAND APPLICATION SITE
EXISTING STP
GARNERSTOWN LAND APPLICATION SITE
ALTERNATIVE 7
SEWANEE
ST. MARYS LAND APPLICATION SITE
NEW FACULTATIVE LAGOON
ABANDON EXISTING STP
GARNERSTOWN LAND APPLICATION SITE

Alternative 1

- Upgrade existing STP
- AST discharge to Depot Branch

Alternative 2

- Construct new STP at existing site
- AST discharge to Depot Branch

Alternative 3

- Upgrade existing STP
- Secondary discharge to Elk River

Alternative 4

- Upgrade existing STP
- Spray irrigation at Rutledge Point site

Alternative 5

- Construct new STP (Facultative Lagoon) at spray site
- Spray irrigation at Rutledge Point Site

Alternative 6

- Upgrade existing STP
- Spray irrigation at St. Marys and Garnerstown sites

Alternative 7

- Construct new STP (Facultative Lagoon) at spray site
- Spray irrigation at St. Marys and Garnerstown sites

Figure S-2 presents configurations of each alternative, outlining proposed collection, conveyance, treatment and disposal facilities. This Figure also locates the site of the present sewage treatment plant.

2. EVALUATION OF ALTERNATIVES

Introduction

Through the evaluation and review process, three of the seven options have been effectively eliminated. Alternative 3 was eliminated because of the cost associated with conveying treated wastewater almost ten miles to the Elk River. Alternatives 4 and 5 were eliminated because of the University's reluctance to locate a sprayfield at Rutledge Point.

Description, and Pros and Cons of Remaining Alternatives

This section presents a description of the remaining four alternatives (Numbers 1, 2, 6 and 7) and a discussion of the pros and cons of each remaining alternative. A cost summary follows.

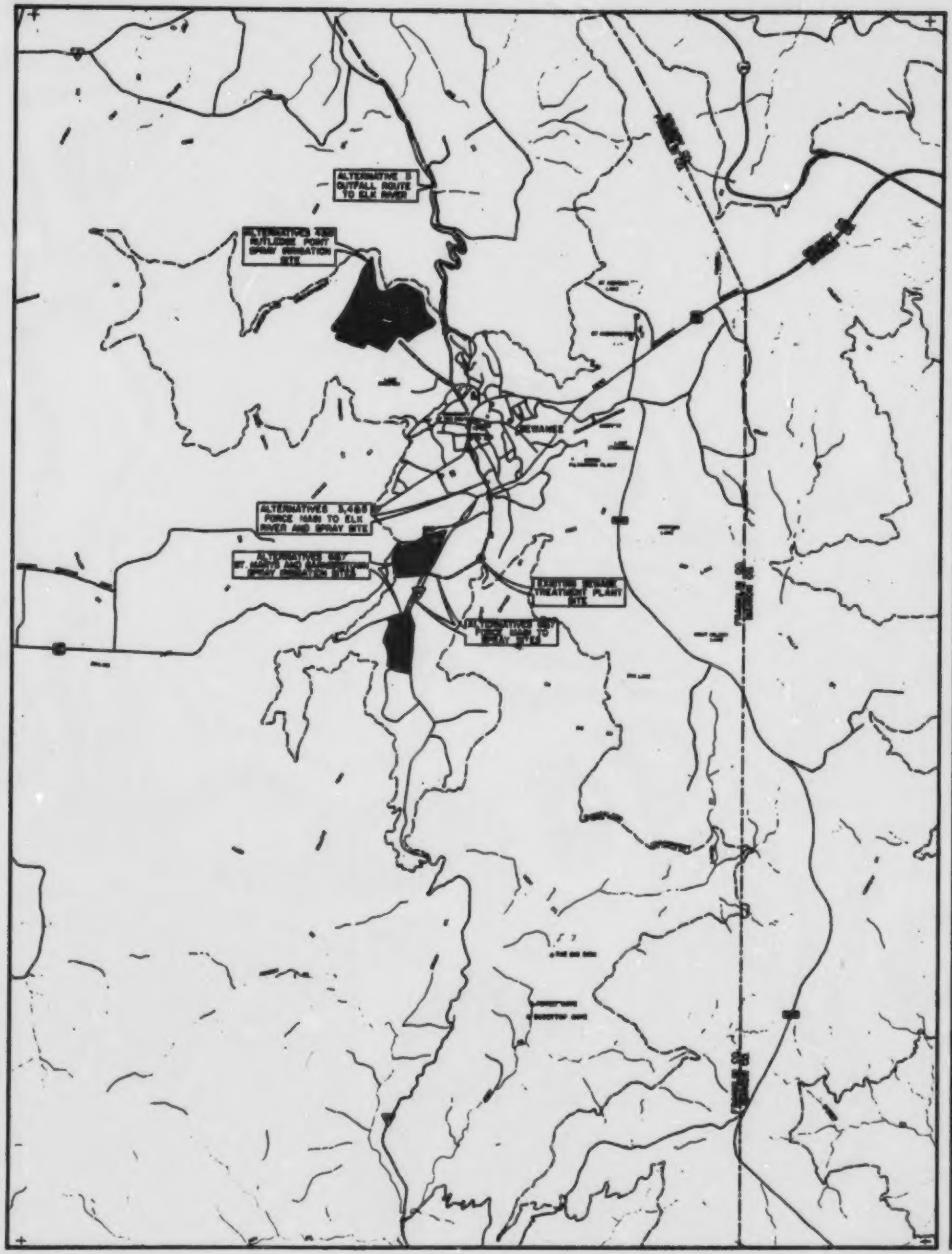
Alternative 1

- Description

1. Upgrade existing STP
2. AST discharge to Depot Branch

- Pros

1. STP upgrading is at existing STP site
2. Upgraded STP and improved reliability would result in improved water quality in Depot Branch and correct odors at existing STP


ALTERNATIVE 3 OUTFALL ROUTE TO ELK RIVER
ALTERNATIVES 4&5 RUTLEDGE POINT SPRAY IRRIGATION SITE
SEWANEE
ALTERNATIVES 3,4&5 FORCE MAIN TO ELK RIVER AND SPRAY SITE
ALTERNATIVES 6&7 ST. MARYS AND GARNERSTOWN SPRAY IRRIGATION SITES
EXISTING SEWAGE TREATMENT PLANT SITE
ALTERNATIVES 6&7 FORCE MAIN TO SPRAY SITES

ALTERNATIVE DESCRIPTION

ALTERNATIVE 1 – UTILIZATION OF UPGRADED EXISTING PROCESS UNITS
DISCHARGE TO DEPOT BRANCH

ALTERNATIVE 2 – INSTALLATION OF NEW PROCESS UNITS AT EXISTING STP SITE
DISCHARGE TO DEPOT BRANCH

ALTERNATIVE 3 – UTILIZATION OF UPGRADED EXISTING PROCESS UNITS
DISCHARGE TO ELK RIVER

ALTERNATIVE 4 – UTILIZATION OF EXISTING PROCESS UNITS
SPRAY IRRIGATION AT RUTLEDGE POINT SITE

ALTERNATIVE 5 – INSTALLATION OF FACULTATIVE LAGOON AT LAND APPLICATION SITE
SPRAY IRRIGATION AT RUTLEDGE POINT SITE

ALTERNATIVE 6 – UTILIZATION OF EXISTING PROCESS UNITS
SPRAY IRRIGATION AT ST. MARYS AND GARNERSTOWN SITES

ALTERNATIVE 7 – INSTALLATION OF FACULTATIVE LAGOON AT LAND APPLICATION SITE
SPRAY IRRIGATION AT ST. MARYS AND GARNERSTOWN SITES

FIGURE S-2

SEWANEE, TENNESSEE
201 FACILITIES PLAN

ENVIRONMENTAL IMPACT STATEMENT

ALTERNATIVES CONFIGURATION

1 1/2 0 1
SCALE IN MILES

U.S. Environmental Protection Agency
Region IV Atlanta, Georgia

3. Improved water quality in Depot Branch would benefit aquatic biology, cave biology, downstream water supplies and recreation areas

4. Total present worth cost of $2.7 million, $0.3 million more than the alternative with the lowest present worth value

5. Public opposition is not expected

- Cons

1. Since the hydrology of Depot Branch is not completely known, the potential exists for the continued discharge to impact downstream water quality and uses (including water supply, recreation and habitat)

2. Annual O&M costs are next to highest ($68,300)

3. Total annual costs of the proposed project are the highest of the four remaining alternatives ($134,300)

Alternative 2

- Description

1. Construct new STP at existing site

2. AST discharge to Depot Branch

- Pros

1. STP construction is on existing STP site

2. Upgraded STP and improved reliability would result in improved water quality in Depot Branch and correct odors at existing STP

3. Improved water quality in Depot Branch would benefit aquatic biology, cave biology, downstream water supplies and recreation areas

4. Lowest total present worth cost ($2.4 million)

5. Public opposition is not expected

- Cons

1. Since the hydrology of Depot Branch is not completely known, the potential exists for the continued discharge to impact downstream water quality and uses (including water supply, recreation and habitat)

2. Annual O&M costs are the highest ($69,800)

3. Total annual cost of the proposed project is the second highest of the four remaining alternatives ($127,400)

Alternative 6

- Description

1. Upgrade existing STP
2. Spray irrigation at St. Marys and Garnerstown sites

- Pros

1. STP upgrading is at existing site
2. Wastewater discharge would be removed from Depot Branch
3. A no discharge option would benefit downstream water quality, aquatic biology, cave biology, water supplies and recreation areas
4. Has the second lowest annual O&M cost ($59,100)
5. Has the second lowest total annual cost of the four remaining alternatives ($120,400)
6. The University of the South is supportive of land application and has shown an interest in developing a power generation system making use of forest biomass as a fuel source and the harvested biomass from the spray field holds potential for direct revenue generation
7. Since the University of the South owns most of the lands in and around the proposed spray sites, future development near the sites can be controlled thereby minimizing conflicts between community development and the Utility District
8. All treatment and land application components of the alternative may receive 85 percent EPA funding
9. The proposed spray sites have been evaluated and have been determined to be suitable for spray irrigation

- Cons

1. Currently four residences are located at and four homes are located across Route 56 from the proposed spray sites, however these homes are leased from the University and may not require re-location.
2. Effluent will have to be conveyed approximately 3000 feet from the STP to the sprayfield
3. The St. Marys site (approx. 90 acres) and the Garnerstown site (approx. 75 acres) will be removed from other development purposes
4. Although most people on the EIS Community Review Group have expressed interest in implementing land application, the

degree of public acceptance on a community-wide basis is not known

5. Has the highest total present worth cost ($3.0 million)

Alternative 7

- Description

1. Construct new STP (Facultative Lagoon) at spray site

2. Spray irrigation at St. Marys and Garnerstown

- Pros

1. STP upgrading is at existing site/spray site

2. Wastewater discharge would be removed from Depot Branch

3. A no discharge option would benefit downstream water quality, aquatic biology, cave biology, water supplies and recreation areas

4. Has the next to the lowest total present worth cost at $2.5 million (after utilizing the 115 percent adjustment factor to compare alternative-technology schemes to conventional schemes).

5. Has the lowest annual O & M cost ($51,900)

6. Has the lowest total annual cost of the four remaining alternatives ($104,600)

7. The University of the South is supportive of land application and has shown an interest in developing a power generation system making use of forest biomass as a fuel source and the harvested biomass from the spray field holds potential for direct revenue generation.

8. Since the University of the South owns most of the lands in and around the proposed spray sites, future development near the sites can be controlled thereby minimizing conflicts between community development and the Utility District

9. All treatment and land application components of the alternative may receive 85 percent EPA funding

10. The proposed spray sites have been evaluated and have been determined to be suitable for spray irrigation

11. Lower power and O & M requirements associated with the facultative lagoon

- Cons

1. Currently four residences are located at and four homes are located across Route 56 from the proposed spray sites, however these homes are leased from the University and may not require re-location.

2. Wastewater will have to be conveyed approximately 3000 feet from the existing STP site to the sprayfield

3. The St. Marys site (approx. 90 acres) and the Garnerstown site (approx. 75 acres) will be removed from other development purposes

4. Although most people on the EIS Community Review Group have expressed interest in implementing land application, the degree of public acceptance on a community-wide basis is not known

Costs of Remaining Alternatives

The costs associated with the remaining alternatives (1, 2, 6, and 7) are summarized in Table S-2.

PART C. FINAL EIS PROPOSED ACTION

Alternative 7 has been selected as the proposed action for the Final EIS. Alternative 7 proposes that the existing STP be replaced by a combined storage pond/facultative lagoon at the proposed spray site and pretreated effluent be spray irrigated at the St. Marys and Garnerstown sites approximately 3000 feet west of the existing STP. This option represents the least cost option in terms of total present worth cost. Another important cost consideration to the community is total annual cost, especially annual O & M cost. Alternative 7 has been determined to be the least cost option in these cost categories.

Land application of effluent will remove the wastewater discharge to Depot Branch of Lost Creek and will benefit water quality, cave resources, aquatic biology, recreation areas and downstream water supplies. A major drawback to 7 is the need to possibly relocate four existing residences. However, any relocation activities will be directed by the University of the South who now owns and lease the land on which these homes have been built.

PART D. DRAFT EIS COMMENTS

Comments on the Draft Statement were received from the following:

TABLE S-2

COSTS ASSOCIATED WITH REMAINING ALTERNATIVES

ALTERNATIVE	PROJECT COST (MILLIONS)	ANNUAL O&M	TOTAL PRESENT WORTH (MILLIONS)	AFTER 115% ADJUSTMENT (MILLIONS)	LOCAL ANNUAL COST	ESTIMATED ANNUAL USER COST
1	$2.3	$68,300	$2.7	$3.1	$134,300	$170
2	$2.0	$69,800	$2.4	$2.8	$127,400	$163
6	$2.9	$59,100	$3.0	$3.0	$120,400	$156
7	$2.4	$51,900	$2.5	$2.5	$104,600	$141

Federal Agencies

U.S. Environmental Protection Agency
Water Quality Management Branch

U.S. Department of Agriculture
Soil Conservation Service

U.S. Department of Health and Human Services
Environmental Health Services Division

U.S. Army Corps of Engineers
Nashville District

U.S. Department of the Interior
Office of the Secretary

Individuals

J. Roy Wauford, J. R. Wauford and Company, Consulting Engineers

Dr. Charles Baird, University of the South

Jack W. Robinson, Attorney, representing the Sisterhood of St. Mary

Brad Neff, Associate Director, Tennessee Karst Research

Dr. Arthur Schaefer, Provost, University of the South

Edmund Kirby-Smith, Sewanee Utility District

William Kershner, Citizen

Henry Ariail, Citizen

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I. INTRODUCTION

This Final Environmental Impact Statement (FEIS) for the Sewanee, Tennessee Wastewater Facilities supplements the Draft EIS issued in August 1981. The EIS has been prepared in accordance with the Council on Environmental Quality (CEQ) Guidelines and EPA Guidelines for the preparation of Environmental Impact Statements. This EIS is also in response to the requirements of Public Law 91-190, the National Environmental Policy Act of 1969, which requires the preparation of an EIS for any major Federal action that will significantly affect the quality of the environment. While this summary document is intended to be comprehensive, the supporting information furnished with the Draft EIS should be reviewed and is incorporated here by reference. It is to be noted that this Final EIS supercedes the Draft EIS wherever conflicts between the two exist.

This Final EIS for Sewanee, TN contains eight major sections. Section II, EPA Decision, describes the preferred approach to wastewater management in the study area and the evaluation process that led to the selection of this alternative. Section III presents a summary of the Draft EIS, including a review of each Chapter in the Draft EIS and major findings and recommendations. Section IV presents any revisions to the Draft EIS (in the form of an errata sheet), and additional information gathered following issuance of the Draft statement in August 1981. EPA's responses to comments received on the Draft EIS are tabulated in Section V. The written comments and the oral comments received at the Public Hearing are indexed in this section. Section VI contains the transcript of the Public Hearing held on October 20, 1981. Letters received commenting on the Draft EIS are presented in Section VII. A list of EIS preparers is presented in Section VIII.

II. EPA DECISION

A. PURPOSE OF AND NEED FOR ACTION

The Sewanee, Tennessee Environmental Impact Statement (EIS) is being prepared to address the provision of wastewater management facilities for the Sewanee area of Tennessee. The study area is situated in the northeastern corner of Franklin County, and is mainly within the 10,000 acre Domain of the University of the South. The existing Sewanee sewage treatment plant and pumping station is located just south of the town of Sewanee. The treatment plant discharges into Depot Branch of Lost Creek. In 1966, the first documented instance of water use conflict occurred when visitors to Buggytop Cave became ill after drinking water found in the cave. The source of the micro-organisms causing the illness was attributed to discharges from the Sewanee sewage treatment plant. The Big Sink, which ultimately receives water from Lost Creek, is believed to provide water to the Peters-Buggytop cave system.

In 1976, the Sewanee Utility District conducted a 201 Wastewater Facilities Plan. Sometime prior to or concurrent with the preparation of the 201 Plan EPA issued, through the State of Tennessee, an NPDES permit to the Sewanee Utility District outlining certain effluent limitations and monitoring requirements. All of the requirements set forth in the permit are standard to the area streams except for the total nitrogen standard. EPA's primary reason for setting the strict standard was to protect the water supplies of residents of the Sherwood area who receive their potable water from wells and springs.

This strict nitrogen standard became the focus of conflict prior to initiation of the EIS. On one hand was the exorbitant Sewanee wastewater system user fees and complexity and costs of operating and maintaining a treatment plant capable of meeting the rigid nitrogen standard. While on the other hand was the real and potential threat odors and turbid, polluted waters have on the recreation value of the downstream Carter Natural Area and the impact of wastewater discharges on downstream water supplies.

Consequently, the EIS became the mechanism through which EPA, by way of three water quality sampling programs conducted in 1977 and 1978, re-evaluated the strict nitrogen effluent limitations. The result of the sampling programs pointed to a lack of evidence that ground and surface waters near Sherwood were adversely impacted by the upstream discharge of the Sewanee plant. Consequently, it was decided by EPA in February 1979 that the strict total nitrogen standard was not appropriate. Therefore, the only nitrogen standard deemed appropriate was the ammonia-nitrogen limitation set by both EPA and the Tennessee Department of Public Health. These effluent limitations are presented in Table S-1, under Description of the Existing Problem in the Executive Summary.

Throughout the decision-making process concerning the nitrogen standard, several key issues of the Sewanee EIS were defined by EPA, including:

- preservatin of surface water and groundwater resources in the Lost Creek and Crow Creek Basins as drinking water.
- coordination of water quality levels in Lost Creek which are consistent with the pending designation of the Lost Cove-Buggytop Cave area as a wilderness area by the State of Tennessee.
- examination of the influence of improved stream quality on aquatic species in the Lost Cove-Buggytop Cave areas in hopes that species which have been intolerant to sewage flows in the past will return to Lost Creek.
- mitigation of potential impacts to the recreational resources of the Carter Natural Area from upstream discharges of the treatment plant.

B. DESCRIPTION OF THE PROPOSED ACTION

This section describes in detail the preferred action for wastewater treatment in the Sewanee area. The action selected by EPA as the preferred alternative for wastewater management for the study area is Alternative 7. This alternative involves the abandonment of the existing sewage treatment plant, the construction of a combined storage pond/facultative lagoon at the spray site with land application of effluent via spray irrigation at the St. Marys and Garnerstown spray sites. The St. Marys and Garnerstown spray sites are located on Figure S-2 in the Executive Summary.

This option is not only environmentally preferred, but also compatible with local economic constraints. Land application of effluent will remove the wastewater discharge to Depot Branch of Lost Creek, thereby benefiting water quality, cave resources, aquatic biology, recreation areas, and downstream water supplies. In addition, this alternative represents the least cost option in terms of total present worth, annual O&M costs and total annual cost. These cost considerations are very important to the community.

Alternative 7 is recommended by EPA following careful consideration of several factors, including the size of the community, the strength of the wastewater, and the lower O&M costs associated with the lagoon. One major drawback to Alternative 7 is the need to possibly relocate four existing residences presently situated at the proposed spray sites. However, any necessary relocation activities will be directed by the University of the South who now owns and leases the land on which these homes have been built.

Treatment Facilities

The proposed treatment facilities will be constructed at the spray irrigation site. This move offers the advantage of consolidation of maintenance at one site for both the spray equipment and the treatment facility. The proposed facility will consist of the following components:

- headworks (at existing STP site)
  - preliminary treatment facility
- facultative lagoon
- sludge drying beds (at lagoon site)
- chlorine contact tank
- control building and laboratory
- pumping facilities to the spray site

The headworks of the facility will consist of preliminary treatment facilities and flow measurement devices. Raw wastewater will flow to the existing plant site for preliminary treatment. In order to reduce extreme flows through the downstream units (in this case, the facultative lagoon), portions of the incoming flow will be stored in the equalization basin to be constructed at the headworks. Stored wastewater will be gradually released, controlling flow to the lagoon.

The wastewater will be given Level B pre-application biological treatment in the lagoon which will consist of 3 cells with total surface area of 12.24 acres. The Level B effluent limitations also include the control of fecal coliforms to less than 1000 MPN/100 ml, therefore, lagoon effluent will be disinfected by chlorination. The chlorinated effluent is then applied, via solid set spray irrigation facilities, to the land application sites.

The sludge that accumulates in the lagoon will be digested in the bottom, anaerobic layer of the lagoon. The digested sludge will then be dredged from the lagoon and dried on open beds followed by land disposal. Due to the small amount of sludge generated in a facultative lagoon, dredging will probably occur only once every 5 to 10 years.

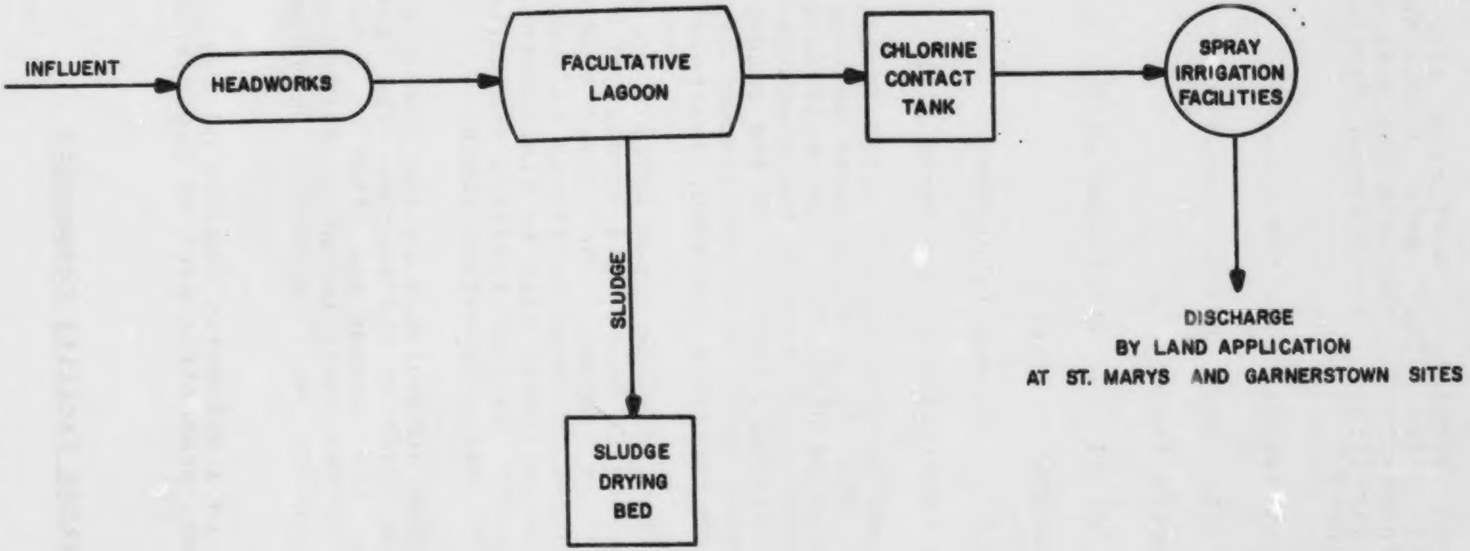
Figure II-1 is a schematic diagram of the preferred alternative's proposed processes, presenting each of the components described above.

Spray Irrigation Facility Components

Components included in the costing of spray irrigation facilities are as follows:

FIGURE II - 1

ALTERNATIVE 7 PROCESS SCHEMATIC
LAND TREATMENT
NEW PLANT SITE
TREATMENT LEVEL B


INFLUENT
HEADWORKS
FACULTATIVE LAGOON
CHLORINE CONTACT TANK
SPRAY IRRIGATION FACILITIES
SLUDGE
SLUDGE DRYING BED
DISCHARGE
BY LAND APPLICATION
AT ST. MARYS AND GARNERSTOWN SITES

EFFLUENT LIMITATIONS

FECAL COLIFORMS-
1000 MPN/ 100ml

SCHEMATIC DOES NOT INDICATE DUPLICATE UNITS

- fencing
- buffer zones (200 feet wide)
- service roads
- distribution pumping
- distribution, solid set spray
- field preparation services
- land costs
- relocation costs

The proposed St. Marys land application site is within approximately 1/2 mile of the town of Sewanee. The St. Marys site, the Garnerstown site (just south of St. Marys), and the facultative lagoon will have a natural buffer zone of forest surrounding them, in addition to total enclosure by fencing. The purpose of both will be to limit public access to, and view of, the proposed sites. The natural buffer zone also preserves the aesthetic quality of the area, particularly around the treatment facility and guards against possible health risks due to aerosol-borne pathogens.

Land Application Sites

Studies were conducted by both Dr. William E. Sopper of the Pennsylvania State University and Soil Systems, Inc. (SSI) to determine the feasibility for disposal of treated wastewater at Sewanee. SSI performed a series of auger borings at the proposed sites to determine the thickness and nature of the soil and prevailing groundwater conditions at each site. These borings indicated that at the St. Marys site, the depth of refusal varied from 2.2 feet to 21.2 feet. Generally, the upper two to eight feet of the boring was easily penetrated by the auger at which point drilling resistance increased steadily until refusal was reached. The soils encountered were generally silty sands to sandy silts. All borings reached refusal in the sandstone unit. At the Garnerstown site, the range of depths was from 3.4 to 33.3 feet. The drilling conditions and soil types were similar to the St. Marys site. In one boring, the sandstone unit was penetrated at a depth of approximately 18 feet. The gray silty clay at the depth encountered is presumed to be the Pennington shale, a unit of Mississippian age which occurs stratigraphically beneath the Pottsville Formation. All other borings reached refusal in the sandstone unit. The SSI report concluded that soil thicknesses at the sites were equal to or greater than expected, and that the soils are of "sufficiently granular nature to warrant further investigation of permeability and other physical properties pertaining to percolation rates." In addition, the SSI report concluded that groundwater would not be a restricting factor in the application of wastewater, as none was encountered in any of the borings.

Dr. Sopper's study consisted of evaluation of topography and an evaluation of the physical, chemical, and hydrological properties of each soil type. He determined that the topography of the St. Marys and Garnerstown areas (less than 15 percent slope) is generally suitable for a spray irrigation system. His results also indicate that application rates of up to 3 inches per week would be feasible. Additionally, as a result of the analyses, Dr. Sopper concluded that nutrient levels of the soils are extremely low and all sites would benefit from the application of wastewater, with the probability that tree growth would be greatly increased. He concluded that, as concentrations of trace metals in the soils are presently extremely low, application of wastewater, with low concentrations of trace metals would not pose problems in terms of phytotoxicity to vegetation or degradation of soil percolate or groundwater quality. Therefore, overall results indicate that the proposed St. Marys and Garnerstown sites are quite acceptable in terms of physical and hydrological properties of the soils and topography.

The St. Marys land application site consists of approximately 90 acres and is located just west of the existing Sewanee wastewater treatment plant. The facultative lagoon is proposed to be developed at this site. The St. Marys site would be the principal land application site. The Garnerstown site (approximately 75 acres), situated approximately 1/2 mile south of the St. Marys site, would be a backup site. Figures S-2 and II-2 locate both sites.

Monitoring Program

A comprehensive monitoring program is required for the proposed selected treatment/disposal system to ensure that proper renovation of wastewater is occurring and that environmental degradation is not occurring. Monitoring of flows in the proposed treatment facilities (facultative lagoon system) is minimal compared to the monitoring requirements of a sophisticated conventional treatment system, therefore, the addition of this proposed monitoring program will not require more laboratory related costs. The components of the environment that are usually observed at land application sites include; applied effluent, surface waters, soils, groundwater, and vegetation. For sites used in the production of crops for harvesting, monitoring of vegetation for plant tissue analysis may be required for the purpose of optimizing growth and yield. Since the selected site areas in this study will be only maintaining forest land, there is no need to include this component in the proposed monitoring program.

A preliminary monitoring program was developed for the proposed alternative which incorporates observations of each component of the environment. A major portion of the proposed program involved the design and installation of a network of wells to monitor groundwater level and quality. The network included three types of wells; background, perimeter, and on-site. This is so that the groundwater samples will represent the contribution from all points of the surface area with each contributor arriving at the wells at different times. Before locating wells, it is suggested that a groundwater flow model illustrating the water flow lines be developed to assist in the location of the wells. Also proposed is a hydrogeologic investigation to enable the determination of the number, depth, and location of the wells so as to obtain the most representative sample of groundwater quality and level. Six wells and one surface water sampling site are tentatively proposed for the study area. The wells include two background, three perimeter and one on-site. Figure II-2 locates the preliminary site for surface water sampling, and for the six wells. Also on Figure II-2 is the site of the existing sewage treatment plant and the proposed facultative lagoon site. The costs of a comprehensive monitoring program have been included in the costing of the preferred alternative.

A suggested monitoring program is illustrated in Table II-1. This table shows the constituents generally monitored and the frequency of sampling. It should be noted that applied effluent and groundwater should be tested initially and periodically thereafter, as appropriate, for heavy metals and trace organics. Also, if filtered samples of raw wastewater demonstrate the concentration of a particular health-significant parameter, not listed in the table, to be in excess of the permissible limit for drinking water sources, that parameter should be included in the schedule.

C. COST EVALUATION SUMMARY

There are two general types of analyses that are considered in the cost evaluation; the present worth cost analysis and the local annual cost analysis. The present worth analysis establishes comparative total costs (capital and annual operations costs) for each of the alternatives over the planning period, including the federal share associated with construction grants. This analysis is an EPA requirement in performing the cost-effectiveness evaluation and is used as the primary cost evaluation criteria. The local annual cost analysis compares the local share of the cost of constructing, operating, and maintaining the waste water system on an annual basis. It is a measure of annual revenue requirements and, therefore, of cost to the users. This cost analysis is conducted as a secondary cost evaluation, not to be used as the alternative cost ranking mechanism. The implementation of the proposed alternatives is better gauged with such information leading to the estimated annual cost to the users. This is further addressed in the Implementability Evaluation in this section.

Cost Development

To calculate both the present worth and local annual costs for the cost evaluation, it is necessary to first develop the cost components. They are construction, project, and operation and maintenance (O&M) costs. All costs are adjusted to reflect local area, last quarter 1978 price and labor rate levels. For the purposes of the cost

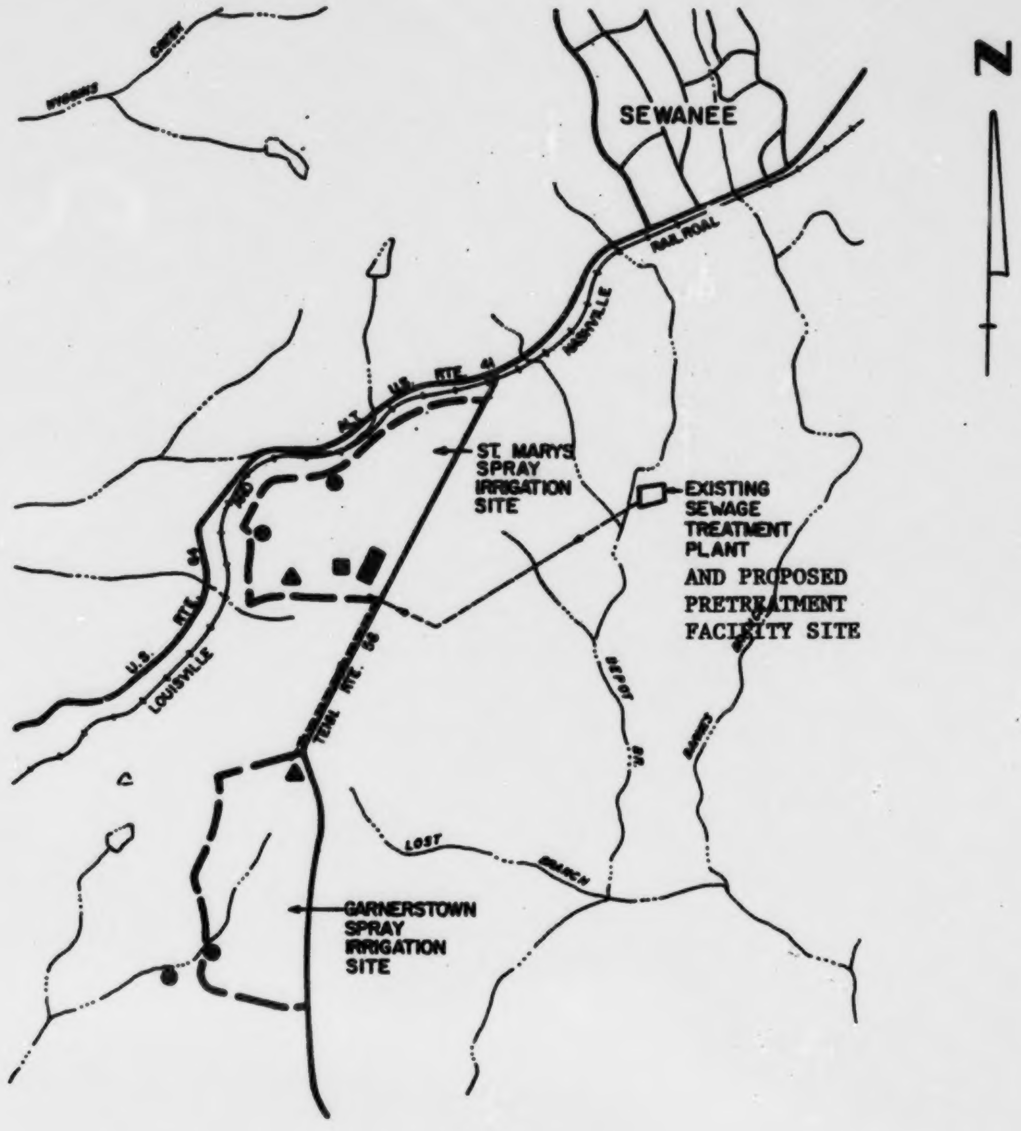

N
WIGGINS CREEK
SEWANEE
RAIL ROAD
NASHVILLE
ALT. U.S. RTE. 41
ST. MARYS SPRAY IRRIGATION SITE
EXISTING SEWAGE TREATMENT PLANT
AND PROPOSED PRETREATMENT FACILITY SITE
U.S. RTE. 41
LOUISVILLE
TENN. RTE. 56
DEPOT BR.
LOST BRANCH
GARNERSTOWN SPRAY IRRIGATION SITE
LEGEND
FORCE MAIN
PRELIMINARY FACULTATIVE LAGOON SITE
PRELIMINARY SURFACE WATER SAMPLING SITE
PRELIMINARY BACKGROUND WELL SITE
PRELIMINARY ON-SITE WELL SITE
PRELIMINARY PERIMETER WELL SITE
0
1000
2000
4000
SCALE IN FEET

FIGURE II-2

PRELIMINARY MONITORING SYSTEM SITES

TABLE II-1

PROPOSED MONITORING PROGRAM
FOR SPRAY IRRIGATION SITE

Parameter	Applied Effluent	Soil	Groundwater On-Site Wells	Groundwater Perimeter Wells	Groundwater Background Wells	Receiving Surface Waters
Flow (2)	C	-	-	-	-	Q
BOD or TOC	D	-	Q	Q	Q	Q
COD	W (1)	-	Q	Q	Q	Q
Suspended Solids	D	-	-	-	-	-
Nitrogen, total	W (1)	2A	Q	Q	Q	Q
Nitrogen, nitrate	-	-	Q	Q	Q	-
Phosphorus, total	M (1)	2A	Q	Q	Q	Q
Coliforms, total	D	-	Q	Q	Q	Q
Coliforms, fecal	M	-	Q	Q	Q	Q
Chlorine, residual	2D	-	-	-	-	-
pH (2)	2D	Q	Q	Q	Q	Q
Total dissolved solids	M	-	Q	Q	Q	Q
Alkalinity	M	-	Q	Q	Q	Q
Sodium Adsorption Ratio	M	Q	Q	Q	Q	Q
Static Water Level (2)	-	-	M	M	M	-

NOTE:
C = Continuously
D = Daily
2D = Two samples per day
W = Weekly
M = Monthly
Q = Quarterly
A = Annually
2A = Two samples per year
(1) = Denotes samples to be 24-hour composites. All others are grab samples.
(2) = Field measurement.

analysis, construction of the wastewater facilities is assumed to begin in 1983, resulting in a 17-year planning period which extends to the year 2000. In accordance with EPA guidelines, allowances are made for salvage value at the end of the planning period.

Component construction and O&M costs have been gathered primarily from two sources. Cost curves contained in the 1978 EPA Small Community Wastewater Treatment Facilities-Biological Treatment Systems publication are utilized to estimate the costs for the majority of the new treatment process units. Costs associated with the land application components are based on cost curves presented in the 1979 EPA Cost of Land Treatment Systems publication. Other costs were estimated and obtained from the contract consultant's wastewater facilities design specialist and from the 201 Facilities Plan.

Table II-2 presents the present worth analysis, local annual costs and annual user costs for the preferred alternative.

Present Worth Analysis

The present worth cost analysis establishes a total cost value of the capital expenditures and operating costs of each alternative over the duration of the planning period. All construction is assumed to be performed during 1982-1983, with no planned phasing of construction due to the relatively small size of the project and limited growth over the planning period. The total 1983 present worth costs for the preferred alternative are shown in Table II-2. This cost is the estimated project cost associated with a wastewater management alternative plus the present worth of annual O&M costs during the planning period, minus the present worth salvage value of the particular treatment/disposal system at the end of the planning period (year 2000). The variation of the total present worth costs with the effluent application rate for Alternative 7 (preferred alternative) is presented below:

Application Rate	Alternative 7
4 in/wk	$2,488,400
3 in/wk	2,521,000
2 in/wk	2,563,100
1 in/wk	2,721,800

As noted before, an application rate of 3 inches per week is used for the cost evaluation.

Local Annual Cost Analysis

Local annual costs reflect more closely the relative impacts of the alternatives on the system owner, the Sewanee Utility District,

TABLE II-2

PREFERRED ALTERNATIVE COST SUMMARY*

Present Worth Analysis

Preferred Alternative	1983 Project Cost	Year 2000 Salvage Value	Present Worth Salvage Value	Net Present Worth	Annual O & M Costs	Present Worth Annual O & M Costs	Total Present Worth
Alternative 7 Facultative Lagoon with Spray Irrigation	$2,435,600	$1,253,700	$407,600	$2,028,000	$51,900	$493,000	$2,521,000*

Estimated Local Annual Costs

Preferred Alternative	Construction Costs	Project Costs	Assumed Grant Eligible Project Costs	Anticipated Grants	Local Share Project Costs	Annual Debt Service	1983 O & M Service	Total Local Annual Costs
Alternative 7 Facultative Lagoon with Spray Irrigation	$1,873,500	$2,435,600	$2,192,000	$1,863,200	$572,400	$46,700	$50,300	$104,600

Estimated Annual User Costs**

Preferred Alternative	1983 Total Annual Local Cost	Average Cost per 1000 Gallons of Billable Water Consumption	Monthly User Costs	Annual User Costs
Alternative 7 Facultative Lagoon with Spray Irrigation	$146,200	$2.34	$11.80	$141.00

* Assumes 3 inches per week effluent application rate.

**Includes existing annual costspresently being incurred.

and its users. These costs are computed accounting for the federal construction grant for the new wastewater facilities. The remaining costs of construction and other related project costs not covered by the federal grant are amortized as an assumed 30-year debt at the federal 7.125 percent interest rate. This debt service together with past debt service obligations and estimated operation and maintenance costs of the facilities for one year are used in determining the local annual cost for each alternative. As stated previously, this cost analysis is intended to help evaluate the potential for implementation of the alternatives in light of the projected "user cost".

Table II-2 displays the new project total annual costs and reflects local annual costs for the new project proposed in Alternative 7. It was determined by the cost evaluation that Alternative 7 (the preferred alternative) is the most desirable by having the lowest total local annual costs and the lowest average residential estimated annual user cost.

D. OPERABILITY EVALUATION SUMMARY

System operability provides a measure of the ability of a wastewater management system to continuously provide the service for which it is designed. The evaluation of operability of the systems should include the assessment of the following three factors:

- reliability of treatment
- flexibility of operations
- maintainability of facilities

Evaluation of reliability considers the ability of the treatment process and spray irrigation facilities to maintain the intended treatment levels. Operational flexibility is a measure of the ability of treatment components to adapt to changes in wastewater characteristics and to comply with changes in water quality goals. Maintainability considerations include the complexity of equipment, frequency of maintenance down time, and efficiency of providing required maintenance.

In order to provide a comparative operability ranking of the seven wastewater management alternatives, a numerical rating system has been developed which combines ratings for each of the above factors into a total operability score. The rating system provides for a maximum possible operability score of 100 points. Flexibility, reliability and maintainability are weighted at thirty (30), forty (40), and thirty (30) points, respectively, thus indicating reliability to be the most significant factor. For any given alternative each operability factor is rated on a scale of 1 to 10, ten (10) being excellent and one (1) being poor. This rating is multiplied by the weighting proportion to determine the score. For example, a reliability rating of 6, translates to a score of 24.

$$\left(\frac{6}{10} = \frac{24}{40}\right)$$

The most desirable alternative as a result of the operability evaluation is Alternative 2- Construction of new STP with activated sludge treatment units and surface discharge to Depot Branch. A close second is Alternative 7- Construction of new STP with a facultative lagoon and land application via spray irrigation at the St. Marys and Garnerstown sites.

It should be noted that the overall operability ranking is a relative desirability based upon operational ease and that there are no serious operational problems projected for any of the proposed alternatives.

E. IMPLEMENTABILITY SUMMARY

System implementability considers the practicalities of implementing a specific wastewater management alternative within the study area. The implementability evaluation rating provides a method for assessing the factors that affect the successful implementation of the alternatives based on public and institutional realities. The three factors to be considered and assessed are public acceptability, management concerns, and planning flexibility.

Unlike the other evaluations in the cost-effectiveness analysis (costs, operability, and environmental impacts), the implementability rating is not independent, but rather is somewhat dependent on the results of the other evaluations. This is especially the case with public acceptance which is very much influenced by the estimated users costs and the environmental impacts of the various alternatives.

Public acceptability of a wastewater facilities plan is crucial to its total implementability. An important concern to the public is the effect a particular alternative will have on the local financial capabilities, particularly the local annual cost associated with a particular alternative. The local annual cost includes annual operation and maintenance costs plus the annualized local share of the cost of constructing the wastewater facilities. This is a measure of annual revenue requirements and, therefore, the estimated user costs. Table II-2 presents local annual costs, including estimated annual user costs, for the preferred alternative. Generally, much emphasis is put on the local annual costs for the final implementability evaluation. This favors the land application alternatives with the preferred alternative (#7) having the lowest cost.

Both the type of treatment facilities and the type of disposal facilities affect the environment and are of concern to the public. The proposed facultative lagoon has created concern among the citizens mainly due to the lack of available information on successful lagoon performance in the State of Tennessee. The proposed disposal method is spray irrigation, however, spray irrigation alternatives do often arouse adverse public reaction. Based upon prior EIS Community Review Group meetings and communications from the University of the South, land application in the Sewanee area does not seem to be a potential problem in terms of public acceptability. Most people sitting on the EIS Community Review Group have expressed interest in implementing land application of wastewater effluent.

Another factor to be considered in the implementation of an alternative is management concerns. It is assumed that the Sewanee Utility District will continue to own and operate the wastewater facilities. This will help in providing continuity of management throughout the selected project.

The proposed land application system may present some problems due to the necessity of proper operation of spray irrigation facilities to avoid odor, aerosol, and runoff problems. Experience in these types of management/operation problems is not generally available among conventionally-trained wastewater treatment plant operators, although instruction, education and technical assistance is available.

The final factor in implementability is that of planning flexibility. Planning flexibility is a measure of which alternative will provide the greatest latitude for future planning decisions. This mainly concerns the commitment of large tracts of land for a specified land use under the proposed land application alternatives. The ability of all alternatives to adjust to changes, created by future planning decisions, in wastewater flows (both volume and pollutant load) and changes in water quality goals was addressed in the operability evaluation.

Overall, the implementability evaluation ranking indicates that Alternative 2 is the most desirable with Alternative 1 and the preferred alternative providing very close seconds.

F. ENVIRONMENTAL EVALUATION SUMMARY

In order to incorporate environmental impacts evaluation into a cost-effectiveness analysis or to compare relative impacts of one wastewater management alternative with another, it is necessary to quantify or assign a numerical value to this subjective evaluation. This Section deals with the development of numerical environmental impacts ratings for both the natural and man-made environment and includes a description of the evaluation methodology, a numerical ranking of the eight wastewater management alternatives with respect to natural and man-made environmental impacts, and a discussion of the impacts for each of the alternatives.

A parameter-checklist evaluation methodology was used for the evaluation of impacts to the natural and man-made environment for the eight wastewater management alternatives. This methodology presented a specific list of environmental parameters to be investigated for possible impacts but did not require the establishment of direct cause-effect links to project activities. The list of parameters to be investigated was based on the Environmental Inventory prepared for the project, with special emphasis on those resources that had been identified as sensitive.

A scaling-weighting checklist was used in this project for the evaluation of potential impacts to the environment. Scaling factors were used to estimate the relative magnitude of impacts while weighting factors were used to estimate the relative importance of impacts. Weighting (importance) factors were assigned to each environmental parameter and were constant for all alternatives. Scaling factors varied according to the magnitude of the impact for each alternative.

Factors were assigned to the parameters by an interdisciplinary team of biologists, planners and engineers. Weights and scales ranged from no impact or importance to a highly significant level of importance or impact. Impact scaling factors could be beneficial (+) or adverse (-). The score for an environmental parameter wastewater management alternative combination is the product of the weight and the scale. The summation of the parameter alternative scores for an individual alternative yields a cumulative comparative score for that alternative.

The natural environment evaluation for the preferred strategy indicates that Alternative 7 tied for the third highest rating, coming in very closely behind the highest and second highest scoring alternatives. Alternative 7 was shown to have a positive influence on odor, soils, surface water quality, groundwater, aquatic and cave biology and protected species; while negatively impacting climate, air quality, surface water quantity, and terrestrial ecology.

The man-made environment evaluation for the preferred strategy indicates that Alternative 7 has the highest rating, positively impacting population, land use, cultural resources, recreational resources, wastewater and water supply programs, and community services and facilities. The only negative impact was shown to be on transportation. The overall environmental evaluation results indicate that the preferred alternative (#7) tied for the second highest ranking.

G. EIS REQUIREMENTS

The following EIS Requirements are included to mitigate adverse or potential adverse affects of the proposed action. These requirements will be incorporated into the project as special grant conditions.

Comprehensive Monitoring Program

To ensure that proper renovation of wastewater is occurring and that environmental degradation is not occurring, a comprehensive monitoring program similar to that which is suggested in Section II.B. of this report (pages II-5, 6) is required to be developed and submitted to EPA and the State for review and approval. The monitoring program shall be approved prior to the issuance of funds for project construction.

Archaeological Surveys

Since the exact placement of facilities is not known at this time, detailed surveys have not been performed. Archaeological surveys will be performed during facilities design prior to the issuance of funds for project construction. Surveys that are performed will be completed to the satisfaction of the State Archaeologist and the State Historic Preservation Officer. Should resources be discovered, the appropriate state office should be contacted for appropriate preservation, avoidance or other mitigative measures. No construction will take place until the appropriate state offices have been satisfied with the selected mitigative measures.

III. DRAFT EIS SUMMARY

A. BACKGROUND OF THE STUDY

The Sewanee, Tennessee Environmental Impact Statement (EIS) is being prepared to address the provision of wastewater management facilities for the Sewanee area of Tennessee. The study area is situated in the northeastern corner of Franklin County, and is mainly within the 10,000 acre Domain of the University of the South. The existing Sewanee sewage treatment plant and pumping station is located just south of the town of Sewanee. The treatment plant discharges into Depot Branch of Lost Creek. In 1966, the first documented instance of water use conflict occurred when visitors to Buggytop Cave became ill after drinking water found in the cave. The source of the micro-organisms causing the illness was attributed to discharges from the Sewanee sewage treatment plant. The Big Sink, which ultimately receives water from Lost Creek, is believed to provide water to the Peters-Buggytop cave system.

In 1976, the Sewanee Utility District conducted a 201 Wastewater Facilities Plan. J. R. Wauford and Company, Consulting Engineers of Nashville, Tennessee was hired as the consultant for preparation of the 201 Plan.

Sometime prior to or concurrent with the preparation of the 201 Plan, EPA issued, through the State of Tennessee, an NPDES permit to the Sewanee Utility District outlining certain effluent limitations and monitoring requirements. All of the requirements set forth in this permit are standard to the area receiving streams except for the total nitrogen standard. This standard was set at a highly rigid average of 10 mg/l. EPA's primary reason for setting the strict standard was to protect the water supplies of residents of the Sherwood area who receive their potable water from wells and springs.

Once completed, the 201 Plan's recommended alternative proposed the construction of a new treatment plant and monitoring of the plant's discharge to determine if additional treatment would be required. This treatment and discharge standard, however, did not meet the EPA nitrogen requirement. Therefore, the 201 Plan was not approved.

In October 1977, EPA initiated the preparation of the Sewanee EIS. The primary focus of the EIS was the elimination of potential threats to the natural and cultural environment as the result of discharge from the existing sewage treatment plant.

The nitrogen standard became the focus of conflict prior to initiation of the EIS. On one hand was the exorbitant Sewanee wastewater system user fees and complexity and costs of operating and maintaining a treatment plant capable of meeting the rigid nitrogen standard. While, on the other hand, was the real and potential threat odors and turbid, polluted waters have on the recreational value of the downstream Carter Natural Area and the impact of wastewater discharges on downstream water supplies.

Consequently, the EIS became the mechanism through which EPA, by way of three water quality sampling programs conducted in 1977 and 1978, re-evaluated the strict nitrogen effluent limitations. The result of the sampling programs pointed to a lack of evidence that ground and surface waters near Sherwood were adversely impacted by the upstream discharge of the Sewanee plant. Consequently, it was decided by EPA in February 1979 that the strict total nitrogen standard was not appropriate. Therefore, the only nitrogen standard deemed appropriate was the ammonia-nitrogen limitation set by both EPA and the Tennessee Department of Public Health.

B. ALTERNATIVES DEVELOPMENT AND EVALUATION

The process of developing alternative wastewater management schemes for the Sewanee area involved a presentation of a range of structural engineering alternatives and non-structural considerations for the solution of wastewater management problems. However, the selection of final alternatives was not limited solely to either of these two categories, but integrated both structural and non-structural schemes into the proposed wastewater management system.

The first step in the process of developing wastewater management alternatives was the development of structural solutions to the Sewanee area's water quality problems. Four major structural alternative categories were investigated. They are: a collection network and its associated service area; treated wastewater disposal locations; wastewater treatment facilities; and other structural considerations which do not fit into the first three categories.

For the Sewanee study area, two general discharge alternatives were considered for disposal of wastewater effluent: discharge to local receiving waters and discharge by means of land application. Specifically, five receiving streams and three land application sites were considered.

Based upon effluent limitations, three wastewater treatment alternatives were developed for the Sewanee area. They are: 1) Advanced and Nitrification Treatment, 2) Secondary Treatment, and 3) Biological Treatment by Lagoons. It was determined that these three treatment alternatives could be applied to either the continued utilization of the existing treatment plant site or an alternative treatment site.

In order to achieve the desired level of treatment associated with each treatment alternative for the Sewanee area, various unit process configurations were considered. These unit process configurations formulate treatment process trains based not only on the effluent limitations for the various discharge alternatives but also on the existing wastewater treatment plant process units and their present condition; existing treatment plant site constraints; and the reliability classifications affecting duplication of upgraded or new units, or both.

Other structural alternatives considered for the Sewanee study area included the continued use of on-lot wastewater systems in the Sewanee area, and also wastewater treatment and disposal for St. Andrews.

Several non-structural alternative wastewater management considerations were investigated for application to the Sewanee area. They are: improved operation and maintenance, flow and waste reduction measures, and management district concepts.

The second phase of alternatives development involved screening various wastewater treatment/disposal techniques for applicability in the Sewanee study area. This preliminary screening eliminated the less desirable alternatives (due to cost and environmental disadvantages) from further analysis, simplifying the later detailed evaluation.

Based upon the wastewater treatment and disposal alternatives developed thus far and other wastewater management considerations, seven treatment/disposal schemes were developed. These schemes comprise the wastewater management alternatives evaluated for the selection of a water quality plan of action. A brief description of the components of each of the seven alternatives follows.

Alternative 1 - Advanced, Nitrification (Class II)
Upgrade existing units

a.) At present only one primary clarifier exists; an additional unit will have to be added.

b.) The combination of the existing trickling filter and the proposed activated sludge units will, as a system, meet reliability criteria.

c.) Two secondary clarifiers will need to be constructed.

Alternative 2 - Advanced, Nitrification (Class II)
Abandon existing units

a.) Dual extended aeration basins will be required.

b.) Duplication of the secondary clarifiers is required.

Alternative 3 - Secondary (Class II)
Upgrade existing units

a.) Only one primary clarifier exists; an additional unit will have to be added.

b.) A second trickling filter will have to be added to supplement the existing trickling filter.

c.) Two secondary clarifiers will have to be constructed.

Alternatives 4 and 6 - Land Treatment (Class III)
Upgrade Existing Units

a.) An additional primary clarifier will be required but since t clarifier is the only major component in the system it was sized according to the reliability requirements for biological treatment components of Class I. This should compensate for the lack of other treatment units in this unconventional system.

Alternatives 5 and 7 - Land Treatment (Class III)
Abandon existing units

a) No duplication necessary for a facultative lagoon.

In addition, a no-action alternative was developed and compared with the most cost-effective structural alternative with respect to cost, operability, and implementability.

Figure S-2 in the Executive Summary presents configurations of all seven alternatives. The present worth analysis of all seven alternatives is presented in Table III-1.

C. DESCRIPTION OF THE PREFERRED ALTERNATIVE

This section briefly describes the preferred action for wastewater treatment in the Sewanee area. The action selected by EPA as the preferred alternative for wastewater management for the study area is Alternative 7. This alternative involves the abandonment of the existing sewage treatment plant, the construction of a combined storage pond/facultative lagoon at the spray site with land application of effluent via spray irrigation at the St. Marys and Garnerstown spray sites. Figure III-1 presents the process schematic for the preferred alternative.

The proposed treatment facilities will be constructed at the spray irrigation site. This move offers the advantage of consolidation of maintenance at one site for both the spray equipment and the treatment facility.

The headworks of the facility (to be located at the existing STP site) will consist of an equalization basin, preliminary treatment facilities, and flow measurement devices. Raw wastewater will flow to the existing plant site for preliminary treatment. In order to reduce extreme flows through the downstream units (in this case, the facultative lagoon), portions of the incoming flow will be stored in the equalization basin to be constructed at the headworks. Stored wastewater will be gradually released, controlling flow to the lagoon.

The wastewater will be given Level B pre-application biological treatment in the lagoon which will consist of 3 cells with total sur-

TABLE III-1

WASTEWATER MANAGEMENT ALTERNATIVES
PRESENT WORTH ANALYSIS (1)

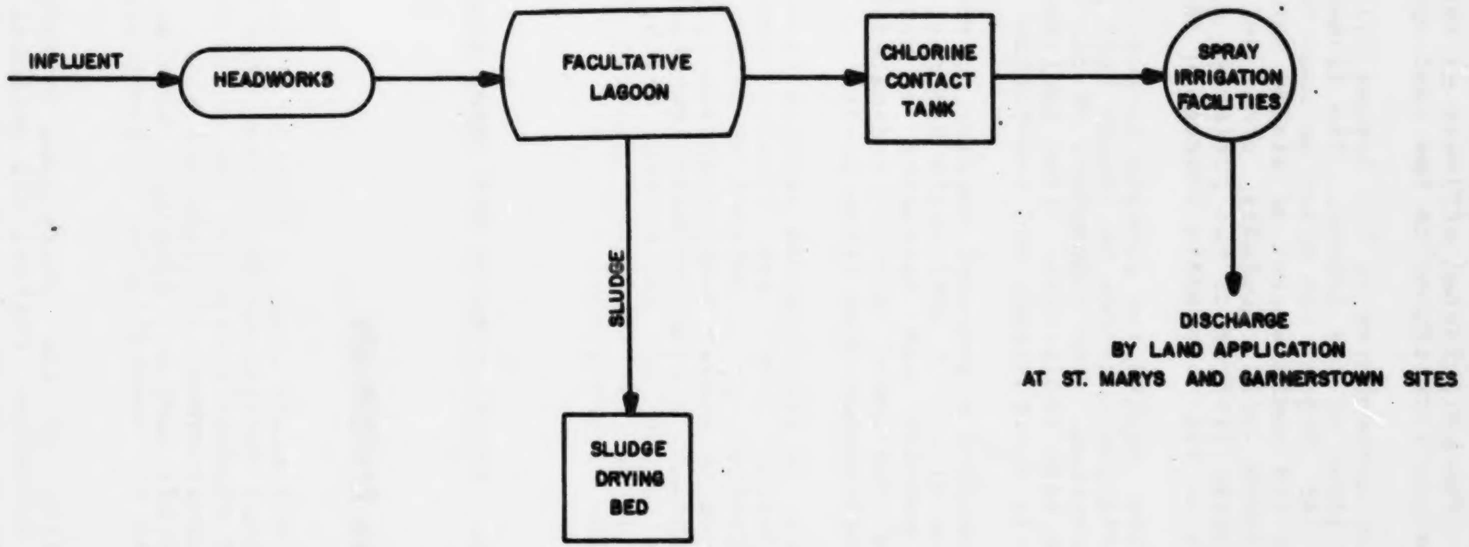
				Spray Irrigation			
	Discharge to Depot Branch		Discharge to Elk River	Discharge to Rutledge Farm Site		Discharge to Garnerstown & St. Marys Sites	
Capital Cost	Exist. Units Alt. 1	New Process Alt. 2	Exist. Units Alt. 3	Exist. Units Alt. 4	Facul. Lag. Alt. 5	Exist. Units Alt. 6	Facul. Lag. Alt. 7
Treatment Plant							
1983 Project Cost	$2,277,700	$ 1,965,300	$2,084,000	$1,542,600	$ 832,400	$1,542,600	$ 832,400
2000 Salvage Value(2)	842,700	727,200	771,100	570,800	308,000	570,800	308,000
P.W. Salvage Value	261,600	225,700	239,300	177,200	114,000	177,200	114,000
Net Present Worth	2,016,100	1,739,600	1,844,700	1,365,400	718,400	1,365,400	718,400
Conveyance							
1983 Project Cost	-	-	1,058,000	363,500	363,500	190,200	190,200
2000 Salvage Value(2)	-	-	695,000	239,900	239,900	125,500	125,500
P.W. Salvage Value	-	-	215,700	74,500	74,500	39,000	39,000
Net Present Worth	-	-	837,300	289,000	289,000	151,200	151,200
Land Application							
1983 Project Cost	-	-	-	1,394,000	1,643,600	1,163,400	1,413,000
2000 Salvage Value(2)	-	-	-	1,254,600	1,329,400	745,300	820,200
P.W. Salvage Value	-	-	-	389,400	412,700	231,300	254,600
Net Present Worth	-	-	-	1,004,600	1,230,900	932,100	1,158,400
TOTAL NET P.W. CAPITAL COST	$2,016,100	$1,739,600	$2,682,000	$2,659,000	$2,238,300	$2,448,700	$2,028,000
Operating Cost							
2000 Operating Cost	68,300	69,800	54,400	62,300	54,500	59,100	51,900
1983 Operating Cost (3)	66,300	67,700	52,800	60,400	52,900	57,300	50,300
Operating Cost P.W.	649,500	663,400	517,200	592,000	518,200	561,600	493,000
TOTAL PRESENT WORTH	2,665,600	2,403,000	3,199,200	3,251,000	2,756,500	3,010,300	2,521,000
TOTAL PRESENT WORTH ADJUSTED FOR 115 PERCENT SPRAY IRRIGATION ALLOWANCE (4)	3,065,400	2,763,500	3,679,100	3,251,000	2,756,500	3,010,300	2,521,000

(1) Present worth analysis is based on 1981 price levels, 17-year planning period and a 7.125% discount rate
(2) Year 2000 salvage values as percentages of initial construction costs are: conveyance = 66%; treatment plant = 37%; land application = 30% + land s.v
(3) Ratio of 1983/2000 O&M Costs is 0.97 assuming that one fourth of O & M costs are flow related.
(4) In accordance with EPA Program Requirements Memorandum (PRM) 79-3, 15% adjustment of least cost alternative for comparison with innovative/alternative technology alternatives.

Source: GFCC, Inc.

FIGURE III- 1

ALTERNATIVE 7 PROCESS SCHEMATIC
LAND TREATMENT
NEW PLANT SITE
TREATMENT LEVEL B


INFLUENT
HEADWORKS
FACULTATIVE LAGOON
SLUDGE
SLUDGE DRYING BED
CHLORINE CONTACT TANK
SPRAY IRRIGATION FACILITIES
DISCHARGE
BY LAND APPLICATION
AT ST. MARYS AND GARNERSTOWN SITES

EFFLUENT LIMITATIONS

FECAL COLIFORMS-
1000 MPN/ 100ml

SCHEMATIC DOES NOT INDICATE DUPLICATE UNITS face area of 12.24 acres. The Level B effluent limitations also include the control of fecal coliforms to less than 1000 MPN/100 ml, therefore, lagoon effluent will be disinfected by chlorination (chlorine contact tank). The chlorinated effluent is then applied, via solid set spray irrigation facilities, to the land application sites.

The sludge that accumulates in the lagoon will be digested in the bottom, anaerobic layer of the lagoon. The digested sludge will then be dredged from the lagoon and dried on open beds followed by land disposal. Due to the small amount of sludge generated in a facultative lagoon, dredging will probably occur only once every 5 to 10 years. The schematic diagram of the preferred alternative in Figure III-1 presents each of the components described above.

A comprehensive monitoring program is required for the proposed selected treatment/disposal system to ensure that proper renovation of wastewater is occurring. The components of the environment that are usually observed at land application sites include: applied effluent, surface waters, soil, groundwater, and vegetation.

This study developed a proposed monitoring program for the Sewanee land application sites. A monitoring program, which included constituents to be sampled and frequency of sampling was suggested. Additionally, this suggested program indicated the components to be sampled for each constituent (See Table II-1).

A major portion of the proposed program involves the groundwater component. Groundwater level and quality monitoring involves the design and installation of a network of wells. This network is to include three types of wells; background wells, perimeter wells, and on-site wells. Although, a hydrogeologic investigation is proposed to enable the determination of the number, depth, and location of the wells, six wells and one surface water sampling site have been tentatively suggested (See Figure II-2).

D. DESCRIPTION OF THE STUDY AREA

1. EXISTING NATURAL ENVIRONMENT

The Sewanee EIS study area is typical of middle latitude areas, having marked seasonal variations in weather characterized by the frequent occurrence of migratory high and low pressure systems. Winds in the study area rarely exceed 15 miles per hour. Temperatures in the vicinity of the study area are moderate, with an average annual temperature of about 57 F. Precipitation is plentiful, averaging over 62 inches per year.

The air quality of the study area is good. According to the Division of Air Pollution Control all national ambient air quality standards are being met in the Sewanee area, with the possible exception of the standard for photochemical oxidants which may be violated due to natural formation and long range horizontal and vertical transport of ozone.

There are several odor problem areas located and confirmed in the study area. The most chronic of which is associated with the wastewater treatment facility located at Sewanee. Odors can emanate from all processes at the plant with the exception of the digester which is located underground. Odors are also prevalent at the outfall and for several hundred yards downstream. Additionally, objectionable odors have been identified at the mouth of Buggytop Cave downstream from the treatment plant discharge. Lake Cheston, a public swimming and recreation area, was also identified as an odor problem area. Odor problems have also been associated with septic tank failures but the Sewanee Utility District is attempting to rectify this problem.

The Sewanee study area has no serious noise problems, although there are several potential sources of noise in and near the study area including automobile traffic, the Sewanee Airport and a spur and mainline of the Louisville-Nashville Railroad.

Two distinct topographic features, the Cumberland Plateau and the Highland Rim, are contained within the Sewanee study area. The high tableland of the Cumberland Plateau averages 2000 feet above sea level and occupies much of the study area. The town of Sewanee sits on the Cumberland Plateau. The Highland Rim borders the western edge of the Cumberland Plateau. The average altitude of the Highland Rim in the study area is 900-1000 feet above sea level.

The study area is underlain by sediment rocks of lower Pennsylvanian and upper Mississippian age. The Pennsylvanian rocks are mainly limestones which crop out on the flanks of the ridges and underlie the floor of the caves. A sandstone unit, the Sewanee conglomerate, and another remnant sandstone, Warren Point Sandstone, are also present in the study area.

Lost Cove is an incised valley in the Cumberland Plateau extending southward approximately 65 miles from Sewanee to its north in the Crow Creek Valley just north of Sherwood. The valley slope of the cove is interrupted by a barrier wall within which Buggytop Cave is located. The top of the saddle is at 1050 feet elevation which also marks the highest closed depression contour of the depression behind the barrier. The lowest place in the depression is the bottom of Big Sink at 950 feet.

Caves are an important scenic, wilderness, and recreational resource in the study area. There are at least 16 caves known in the study area, in addition to Buggytop Cave. Walker Spring Cave and Wet Cave are particularly noteworthy caves in the area, as they both are large, stream-carrying caves and discharge into tributaries of Mud Creek.

The Buggytop Cave, also known as Lost Cove Cave, is a central feature of the new Carter Natural Area established by the State of Tennessee. The cave is the downstream master trunk conduit for the underground drainage system of Lost Cove. On occasion, the cave stream runs 5 to 8 feet deep at velocities in excess of 10 cubic feet per second. Flood flows in the cave, from indirect geological evidence, are in the order of hundreds of cubic feet per second. The route by which water moves vertically from its swallow point in Big Sink to the stream in Buggytop Cave remains unknown.

The five soil associations of the study area were examined to determine the suitability of the soils for on-lot disposal and spray irrigation. It was determined that most of the soil types found in the study area have moderate to severe limitations for on-lot disposal. A site-specific survey is necessary, however, to establish if reported septic tank malfunctions are due to soil limitations or poor maintenance practices.

Soils are categorized as suitable for spray irrigation based on slope, soil texture, depth to bedrock and water table, pH, erodability, and potential for flooding. In the Sewanee area, three sites were chosen as potential spray irrigation sites. They were St. Marys, Garnerstown and Rutledge Point. Following a detailed soil survey conducted by Dr. William E. Sopper, a land application specialist from The Pennsylvania State University at the three sites, it was determined that all three sites were suitable for the proposed spray irrigation of wastewater.

There are eight drainage basins considered in this study. The present wastewater treatment plant is located in the Lost Creek Drainage Basin and discharges into Depot Branch. Depot Branch flows into the Lower Depot Branch Sub-basin and into the groundwater aquifer. Various other tributaries of the Lost Creek Drainage Basin flow into Lost Creek which also flows into the limestone aquifer and resurfaces only after rainstorms. The creek waters appear to emerge from the mouth of Buggytop Cave to form Crow Creek. Based on this assumption, the existing treatment plant outfall is about 7.8 miles from the nearest human habitation.

During low flow, wastewater discharged into Depot Branch constitutes approximately 30-50 percent of the stream flow. Assuming that all of the Depot Branch waters resurface at the entrance to Buggytop Cave, the Lost Creek watershed and Crow Creek watershed provide an effluent dilution factor of 54 during low flow conditions upstream of Sherwood. During more normal conditions, the dilution factor is approximately 25.

Twenty impounded bodies of water, all man-made, have been identified in the study area. Lakes Jackson and O'Donnell are owned by the University of the South, and are sources of potable water for the Sewanee Utility District. Several other lakes in the area have reported odor and/or pollution problems, some of which may be the result of septic tank seepage.

There are two aquifers in the study area. The first is the perched groundwater body that exists in the sandstone on top of the plateau. The second aquifer is the Monteagle and St. Louis limestones in which a substantial body of groundwater exists, mainly in solution cavities. The Warren Point sandstone is an important aquifer in the Sewanee conglomerate. The Monteagle and St. Louis limestones and two underlying formations which crop up outside the study area are the principal aquifers for the Highland Rim.

The EIS water quality sampling program served two purposes: to assure that NPDES permit limitations were being met; and to evaluate established and recommended water quality criteria for detrimental impacts on downstream aquatic life and water supplies. Three sets of samples were collected in the study. The first set of samples was collected in December 1977 from eighteen selected sites. The second set of samples was collected in April 1978. Sampling was restricted to Lost Cove, Hawkins Cove, two wells, and the water supply of Sherwood. The third set of samples was collected in October 1978 during an extremely low flow period. The sampling results indicate generally good to excellent water quality in the Sewanee area with the exception of Depot Branch. Pollution problems in Depot Branch, particularly elevated phosphate, nitrogen and fecal coliform levels, are associated with the Sewanee wastewater treatment plant. In addition to the Sewanee facility, the St. Andrews wastewater treatment plant is a point source of pollution. Non-point sources are primarily agriculture, septic system seepage and urban runoff.

Sampling indicates healthy aquatic communities and high water quality over most of the study area during low flow conditions. Those sites of poor quality are associated with the Sewanee Wastewater Treatment Plant. The impact of the treatment plant is diminished at the mouth of Lost Cove Cave. Sampling at Lost Cove Cave indicates a population with a low diversity, but a high Biotic Index, reflecting relatively clean water with a low food availability typical of cave systems in general. Periodic high flow conditions may wash the heavy collection of settleable solids in Depot Branch below the treatment plant into the limestone aquifer. During such flows, contamination of groundwater may also occur from silvicultural and agricultural activities in Lost Cove Creek. This has the potential to affect water quality and in turn impact the threatened Tennessee Cave Salamander, Gyrinophilus palleucus, which may inhabit not only Buggytop Cove but the entire complex karst system found under Lost Cove.

The sampling programs conducted under varying flow conditions have produced sufficient water quality data to draw several conclusions concerning the impact of a treated wastewater discharge upon Depot Branch and downstream waters. Certain of these conclusions are based on a preliminary review of the data without benefit of detailed water quality modeling, which would be very difficult in the groundwater regime. The conclusions are as follows:

1. The Sherwood water supply source is essentially geologically isolated from the Sewanee Utility District's wastewater treatment plant effluent discharge point.

2. There is little influence of the wastewater treatment plant effluent discharge as far downstream in the Crow Creek drainage basin as Sherwood.

3. Analysis of the two individual well water supplies near Sherwood indicates little or no impact from the wastewater treatment plant on them.

4. The evidence provided by the sampling results supports the Tennessee State Department of Health's proposed limitations which are primarily directed toward the dissolved oxygen levels in the stream and which eliminate the total nitrogen criterion.

The term terrestrial ecology refers to both terrestrial vegetation patterns and wildlife populations. Although the terrestrial ecosystems of the Sewanee area are relatively undisturbed and remain largely forested, the existing forest communities are primarily second-growth. The composition and extent of present vegetation is largely associated with two landforms which dominate the study area: the level uplands of the Cumberland Plateau, and the steep slopes and cover surrounding the Plateau. Cove forests are generally more highly developed because of more constant moisture availability and greater successional maturity.

There is a variety of wildlife species associated with the plant communities of the study area. Six of these species, which are either known or possibly occurring in the area, are listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) and/or the State of Tennessee. These six are the Tennessee Cave Salamander, *(Gyrinophilus palleucus)*, the Sharp-shinned Hawk *(Accipiter striatus)*, the Gray Bat *(Myotis grisescens)*, the Indiana Bat *(Myotis sodalis)*, and the Cougar *(Felis concolor cougar)*.

There are currently no plant species known from the Sewanee study area which are listed as threatened or endangered by the USFWS or the State of Tennessee. However, there are four plant species known or possibly occurring in the study area which are considered high priority by the USFWS, but are not presently listed due to the lengthy legal and scientific procedures involved in placing species on the official list. These four plants are: the Saxifrage *(Saxifraga careyana)*, the Rosinweed *(Silphium brachiatum)*, the Prairie Clover *(Dalia foliosa)*, and the Yellow Fringeless Orchid *(Platanthera integra)*.

2. EXISTING MAN-MADE ENVIRONMENT

During the period 1960 to 1975, Sewanee's population increases were considerably above those for Franklin County, and also above the overall Tennessee growth rates. However, 1980 preliminary Census figures reveal only an 8.1 percent increase in population from 1970 for the Sewanee Census County District (CCD), while Franklin County and the State of Tennessee exhibited much higher growth rates for that same period of time. Most of the growth in the Sewanee area can probably be attributed to increases in enrollment at the University of the South, which experienced a 62.5 percent increase between 1960 and 1975. The major assumption made concerning population growth in the Sewanee area is that enrollments at the University will continue to gradually increase and along with these increases there will be coinciding growth in faculty and other supporting staff and services. A population projection of 4,232 is estimated for the year 2000 for the

Sewanee area. This is an increase of 32 percent from the 1975 population estimate of 3,211.

Much of the study area is located within the Domain of the University of the South. This ownership has resulted in the development of a picturesque community focused around the University campus. There is no industrial land use in the study area and very little commercial development. Beyond the urbanized area of Sewanee, land is primarily forested, with land at the bottom of the escarpment utilized primarily for agricultural activities. The only substantial commercial development beyond the urbanized area occurs at the intersection of I-24 and U.S. 64/41A. Major land use changes are not expected in the Sewanee area in the future.

The major change in Franklin County employment since 1950 has been the decrease in reliance of the county on agricultural employment while manufacturing employment in the county has continued to increase. This probably reflects the trend of the apparel and textile industries migration from the northeast to the southeastern part of the country. On a comparative basis, the County still has a larger percentage of persons employed in agriculture than either Tennessee or the United States, but lags behind slightly in the manufacturing area despite significant increases since 1950.

The Sewanee area contains a variety of State and University-owned recreational areas. Among established recreation areas in the study area, the Carter Natural Area is the one with the greatest likelihood of being affected by existing wastewater management practices. The Carter Natural Area consists of 140 acres and contains Lost Cove Cave (Buggytop - Peters System), Crow Creek, and the associated gorge.

The wastewater treatment plant serving Sewanee is a biological process facility designed to treat a flow of 0.6 mgd. Major units in the plant, which was built in 1952, include a primary clarifier, a trickling filter, a chlorine contact tank, and an aerobic sludge digester. Replacement parts for many of the units are no longer available. Consequently, the operating condition of the plant is not very good and the potential for incorporating existing facilities into an upgraded plant is limited. The plant is located along Depot Branch approximately 0.7 mile south of the David Crockett Highway. Effluent is discharged into Depot Branch. The Sewanee treatment plant does not appear to be meeting specified standards under its NPDES permit, including fecal coliform levels. Visual observances of the stream, as recorded during water quality sampling at Depot Branch, indicate settleable solid effluent standards are not being met, although plant data indicate otherwise. The plant is not capable of meeting the new treatment requirements.

The Saint Andrews School Wastewater Treatment Plant serves a school with an approximate enrollment of 200 students, half of whom are boarding students. The school is located approximately 1.5 miles northeast of the University of the South, and discharges to Shakerag Hollow Creek which empties into Mud Creek, a tributary of Elk River. Nominally sized at 20,000 gallons per day, this extended aeration plant was upgraded in 1976 to comply with EPA effluent standards.

Additional aeration basin capacity was provided, and post aeration was supplied.

There is still a significant population being served by individual septic tanks in the Sewanee study area. Major areas utilizing on-lot systems include the more recently developing areas on the western and northern periphery of the community of Sewanee. Some parties within the sewered portion of Sewanee may also rely on on-lot disposal systems because the Sewanee Utility District has not actively required connection to sewers when available. Shallow soil depths to sandstone bedrock typically found on the Cumberland Plateau create leachate problems in many areas in and around Sewanee. Septic tank failures have been documented by the Franklin County Health Department. Most of the areas cited for failing septic tanks have been proposed for sewering as described in the Sewanee 201 Facilities Plan.

Two man-made reservoirs, Lake O'Donnell (capacity, 39,000,000 gallons) and Jackson Lake (capacity, 131,000,000 gallons) serve as water supply sources for the Sewanee area. Lake O'Donnell is used as the primary source of water with Jackson Lake as a back-up supply. The water supply filtration plant is located to the west of the Lake O'Donnell. Chemical coagulation followed by settling and filtration are provided for the finished potable supply. Based upon a yearly average, the treatment plant is providing a daily supply of 201,000 gallons to the Utility District.

The community of Sewanee is unique in that nearly all community services are provided by the University. Those services provided by the University include health care, education and libraries, fire protection, police protection, and the administrative arrangement to manage these services. Other services are provided by Franklin County and the Sewanee Utility District.

E. ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

1. IMPACTS ON THE NATURAL ENVIRONMENT

Few significant negative impacts to the existing natural environment are expected with implementation of the preferred alternative. Although, they are not expected to be significant, localized climate changes, air quality and odor problems may be present as a result of land application of effluent and, in the case of odor, with operation of the lagoon.

In several instances negative impacts are proportional to the distance of pipeline. This is true when considering impacts to air quality, topography, geology, terrestrial ecology, and noise. The preferred alternative requires the third least amount of pipeline construction and, therefore, negative impacts are not expected to be significant.

Soil drainage characteristics and levels of chemical constituents may be beneficially affected by the land application system proposed in Alternative 7. Results of chemical analyses of soils in the Sewanee area indicate that nutrient levels of the soils are extremely low and land application sites would benefit from the application of wastewater. Trace metal concentrations in the soils are extremely low, therefore, application of wastewater with low concentrations of trace metals would not pose any problems in terms of phytotoxcity to vegetation or the degradation of soil percolate and groundwater quality.

Potential impacts on the terrestrial ecology of the study area are primarily associated with the construction of wastewater treatment facilities and pipelines. Since the preferred alternative calls for the third least amount of pipeline, the area affected is not of significant size. However, pipeline construction to the St. Marys and Garnerstown spray irrigation sites under the preferred alternative could result in adverse impacts on the nesting of the threatened Sharp-shinned hawk, _Accipiter striatus._ Ecological impacts to the spray irrigation sites will primarily result from the alteration rather than destruction of existing natural communities. Terrestrial communities may be modified in favor of more moist adapted types, with corresponding reductions in dry adapted types. Such alterations are hard to classify as beneficial or adverse, unless the resulting changes incur losses of unique or valuable terrestrial community types or the loss of protected plant or animal species through habitat modifications. Field investigations of the two proposed spray irrigation sites observed no endangered or threatened species nor the presence of likely habitats for such species.

The proposed action is expected to beneficially impact several aspects of the natural environment. Odor sources at the present treatment facility should be eliminated with implementation of the preferred alternative. The water quality of the Lost Creek Cove area would benefit, since the proposed action would eliminate discharge to Depot Branch. Aquatic systems would also benefit from the removal of wastewater from surface streams and the subsequent improvement in water quality. Because the proposed action eliminates the discharge to Depot Branch, the Tennessee Cave Salamander, a protected species known from the Lost Creek Cave, should benefit from habitat improvement. The land application system proposed in the preferred alternative may contribute to groundwater recharge, thereby providing beneficial impacts. There may be minimal adverse impacts to groundwater or surface water resources as a result of surface runoff or seepage.

2. IMPACTS ON THE MAN-MADE ENVIRONMENT

Very few impacts, either adverse or beneficial, to the man-made environment are associated with implementation of the preferred alternative. Some population and residential growth is anticipated with the availability of new facilities, however these changes are not expected to be significant.

Each of the alternatives evaluated for the Sewanee area will place financial burdens of varying degrees on the community. Because the preferred alternative has the lowest local annual costs of all the alternatives evaluated it would place the least burden on the community.

Cultural resources of the study area will not be impacted by the construction of pipeline. However, the proposed St. Marys spray site will be developed adjacent to an existing Civil War overlook. Other than visual impacts there should be no negative affect on this historical site.

Although it requires very little pipeline construction, force main construction required in the preferred alternative may disrupt local traffic on Route 56 for a short period of time.

Recreational resources and wastewater and water supply programs may be beneficially impacted by the preferred alternative. Downstream recreation areas would be benefitted because of removal of wastewater discharge. New facilities and removal of discharge should have a positive influence on wastewater and water supply programs in the area.

F. MITIGATIVE MEASURES, RECOMMENDATIONS AND/OR REQUIREMENTS

For the most part, mitigation of adverse impacts to the natural environment would entail implementation of controls during construction activities. Methods used to avoid adverse impacts to air quality, odor, noise, geology, soils, water resources, surface water quality, aquatic ecology, and terrestrial ecology involve:

- Utilization of best management practices (sludge management techniques to reduce odor, erosion and sedimentation control plans, bank stabilization and immediate revegetation plans, controls to reduce non-point source run-off from construction sites, dust containment practices)
- effective construction equipment (including sound devices) and maintenance of equipment (meeting current emission standards)
- limit amount of land under construction at one time, time construction takes place, and size of pipeline corridors and treatment plant (lagoon) site
- effective land use control to prevent residential development adjacent to treatment sites
- treatment plant inspection to insure proper operation.

In addition to the above methods, impacts to local geologic formations can be mitigated by the use of site-specific studies to determine the proper blasting procedures. In order to monitor potential impacts on groundwater and surface water, a monitoring program has been included as part of the preferred alternative. This program is discussed in Section II, Part B. It is recommended that all construction activities be preceded by field investigations to confirm the potential presence of any protected terrestrial species. If, through investigations, it is determined that protected species are present, they should be either transplanted, relocated or buffered from construction activity.

Effective management of land use through the use of planning and regulatory tools can lessen any undesirable aspects of population growth and increased residential, commercial and industrial development. These tools include comprehensive plans, zoning ordinances, easements, fee simple aquisition of land, conservation zoning district, and floodplain ordinances.

Although there are no known historical or archaeological sites at the proposed spray irrigation sites or within the tentative force main route, there is the potential that undetected resources could be present within these areas. No construction will take place until surveys are completed to the satisfaction of the State Archaeologist and the State Historic Preservation Officer. Should resources be discovered, the appropriate state office should be contacted for appropriate preservation, avoidance or other mitigative measures. No construction will take place until the appropriate state offices have been satisfied with the selected mitigative measures.

Any adverse impacts to recreational resources, transportation facilities, resource use, and community services and facilities, also may be mitigated through the implementation of planning tools.

G. EIS COORDINATION

An important part of the Sewanee, Tennessee EIS process is the public participation program. The program provides for active public involvement in all phases of the EIS process, particularly the development and evaluation of wastewater management systems. The focal point of the public participation program has been the development of a Community Review Group (CRG). This group has served in an advisory capacity to EPA and their consultant GFC&C, Inc., giving interested groups, individuals and government agencies the opportunity to participate in the development of the EIS. The Group met at regular intervals throughout the development of the EIS, responding to reports prepared by EPA, providing local opinion on wastewater issues, and indicating needs and sensitivities of the study area. The membership of the group represented a cross-section of local, regional and state interests who contributed information and comments on the development of the EIS.

The following is a list of the members of the CRG and the organizations they represent:

Name	Representing
Edmund Kirby-Smith	President Sewanee Utility District
Douglas Paschall	Associate Dean of College University of the South
Dr. Arthur Schaefer	Provost University of the South
Carl Reid	University of the South
Ms. Barbara Ellis	Sewanee Community Council
Delegate Assembly c/o Douglas Paschall	University of the South
Honorable James Roy Tipps	County Judges Office Franklin County Courthouse
Robert Ayres	Interim Vice Chancellor University of the South
President	Sewanee Civic Association
Order of Gownsmen c/o Douglas Paschall	University of the South
Charles Baird	Chairman Department of Forestry and Geology University of the South
Dr. Charles McGee Project Leader	Principal Silviculturalist U.S. Forest Service Research Station
David Tate	Grounds and Buildings St. Andrews School
Professor Charles Foreman	Biology Department University of the South
D.B. Potter	Department of Forestry and Geology University of the South
Richard G. Threadgill	Tennessee Department of Public Health 621 Cordell Hull Building
Lynn Moore	County Health Department
John L. Stephens	Franklin County Regional Planning Commission
Dr. Harry Yeatman	Biology Department University of the South

Mr. Robert Richards	Tennessee Department of Conservation
Mr. James Needham	U.S. Soil Conservation Service
Mr. James White	Regional Planning Staff - TVA
Mr. Allen R. Coggins	Division of Planning and Development
Mr. Thomas Camp	Citizen
Mr. David Grant	Building Commissioner Franklin County Courthouse
Mr. Art Brown	Local Planning Div., Planning Office Tennessee State

IV. COMMENTS MADE ON THE DRAFT EIS AND EPA RESPONSES

This section of the Final EIS contains the responses that have been made to comments in writing to EPA and oral comments made at the Public Hearing held in Sewanee on October 20, 1981.

The first part of this section indexes written and oral comments received on the Draft report. The second part refers to the oral comments received at the Public Hearing. A detailed listing of all comments and responses is then included.

A. INDEX OF WRITTEN AND ORAL COMMENTS

Name/Association	Date Received	Concerning
1) J.R. Wauford J.R. Wauford & Company, Consulting Engineers	Letter of 9/16/81	In agreement with conclusions reached; would like to design a sewage pumping station at the existing site; would like to review detailed design criteria used for all components of the proposed system.
2) Dr. Charles Baird University of the South	Telephone Conversation 9/24/81	Comment on error concerning University of the South financial analysis.
3) Leonard W. Nowak Water Quality Management Branch, U.S. EPA	Letter of 10/2/81	Comments on various aspects of the EIS
4) Donald C. Bivens Soil Conservation Service, U.S. Dept. of Agriculture	Letter of 10/15/81	Concerned that some of the data contained in the Sopper and SSI soil reports are insufficient; need to analyze impacts of sprayed effluent on vegetation and/or soils
5) Frank S. Lisella, Ph.D., U.S. Dept. of Health and Human Services	Letter of 10/26/81	Expressed concerns primarily with management aspect of the lagoon and spray fields
6) Jack W. Robinson Attorney, representing the Sisterhood of St. Mary	Letter of 10/29/81	Opposed to the preferred alternative
7) E.C. Moore U.S. Army Corps of Engineers, Nashville District	Letter of 10/29/81	Comments on various aspects of the EIS
8) James H. Lee U.S. Dept. of the Interior	Letter of 10/30/81	Comments on various aspects of the EIS
9) Brad Neff Tennessee Karst Research	Letter of 11/17/81	Supports the preferred alternative

B. INDEX OF ORAL COMMENTS RECEIVED AT THE PUBLIC HEARING

Name/Association	Concerning
1) J.R. Wauford, J.R. Wauford & Associates, Consulting Engineers	Concerned with potential pollution of surface and/or groundwater; innovative and alternative eligibility aspect; next step in process to get to the design stage; 201 Plan revision.
2) Unidentified Speaker	Concerned with insuring workability of system before it is implemented.
3) Dr. Arthur M. Schaefer, Provost, University of the South	University is no longer opposed to the use of a facultative lagoon in the area; appraisal procedure for the land.
4) Edmund Kirby-Smith, President, Sewanee Utility District	Utility District is in favor of facultative lagoon and spray irrigation.
5) Unidentified Speaker	Impact on sewage rates in the county.
6) William K. Kershner, Citizen, Sewanee	Geological characteristics of lagoon site; compensation to owners if wells are contaminated; existing treatment plant indebtedness.
7) Henry Ariail Citizen, Sewanee	Components of proposed system to be present at existing treatment plant site; odors at the pretreatment site.

C. RESPONSES TO WRITTEN AND ORAL COMMENTS

1. J. Roy Wauford Jr., P.E.; J.R. Wauford & Company Consulting Engineers. Letter of September 16, 1981.

   Comment: If the selected plan is used, we would probably want to design a sewage pumping station at the existing treatment plant which would provide for sewage pumps to handle normal flow and stormwater pumps to handle peak I/I conditions; this would require a separate force main and would utilize the freeboard on the facultative lagoon for 500,000 gallons of inflow storage.

   Response: This is a design consideration which would need to be approved by EPA and the State of Tennessee. It would also need to be acceptable to the Sewanee Utility District.

   Comment: We would appreciate an opportunity to review the detailed design criteria used for the sewage pumping station, force main, facultative lagoon and any lines, land application area and application system and laboratory and control building.

   Response: Detailed design criteria has been supplied to Mr. Wauford. A copy of that data is included at the back of this section.

2. Dr. Charles Baird; University of the South. Telephone Conversation of September 24, 1981.

   Comment: Page IV-28. The last two sentences under the "University of the South Financial Analysis" beginning with "It is the fourth..." should be omitted.

   Response: This will be done.

3. Leonard W. Nowak; Water Quality Management Branch, U.S. EPA. Letter of October 2, 1981.

   Comment: The EIS should include some discussion on the ability of the users of the system to pay for it. This should include more detail on existing debts, how and for how long they are paid, alternative sources of funds and mechanisms available for financing the local share.

   Response: A minimal increase in sewer rates in the Sewanee area is anticipated with implementation of the preferred alternative. The current average monthly user cost is $8.85 and is expected to increase by $2.95/month to $11.80. The existing annual costs to the community presently being incurred which will continue as an expense are: collection system operation and maintenance costs; other administrative, billing, and legal costs; the outstanding debt on the 1974 sewer and water revenue bond issue; and the outstanding indebtedness on the sewer rehabilitation bond issue. The remaining outstanding indebtedness on the sewer and water revenue bond issue is $562,575, with annual payments of approximately $42,500. The remaining outstanding indebtedness on the sewer rehabilitation bond issue is $113,208.48 with annual payments of approximately $9,893. There is no debt limit on the utility district. Alternative sources of funds and mechanisms available for financing the local share of the project include floating a bond issue and borrowing funds from a commercial lending institution.

Comment: Tables II-10 and III-2 (in the DEIS) should include data on the percentage of median household income used to pay for the various alternatives.

Response: Median household income data is not available below the county level. Therefore, the percentage of median household income used to pay for the various alternatives can not be determined.

Comment: Proposed user charges should be thoroughly discussed at the Public Hearing on the Draft EIS.

Response: Proposed user charges were discussed at the Public Hearing held on October 20, 1981 to the satisfaction of EPA and the citizens present. There was no adverse reaction to the increases in sewer rental rates.

Comment: The population and per capita flows appear reasonable, however, there must be some justification for assuming all flow is received within 18 hours.

Response: As stated on Page II-3, the Tennessee Department of Public Health Standards require wastewater treatment facilities for plants less that 1 mgd to be sized for the daily flow volume occurring over an 18-hour runoff period.

Comment: Will 100 percent of the population in the sub-basins listed in Table II-1 be served?

Response: It is recommended in the EIS that all homeowners within the service areas be required to connect, therefore alternatives were developed on the assumption that 100 percent of the population in the sub-basins listed would be served.

Comment: The need for and cost-effectiveness of a 497,000 gallon equalization basin must be shown. Generally, for small land systems a storage and preliminary treatment function is accomplished with one pond. The storage requirement should be based on the period of time that the site is unsuitable for spraying or on mechanical reliability.

Response: The need for an equalization basin as part of the preferred alternative was questioned at the Public Hearing on the DEIS (see the transcript of that hearing in Section VI of this report). It was determined that the equalization basin proposed for Sewanee was unnecessary and that any excess storage can be taken care of in the freeboard of the facultative lagoon. The following information, however, refers to the cost-effectiveness of an equalization basin and discusses the storage requirements of the lagoon.

Cost-effectiveness of a 497,000 gallon equalization basin - Refer to page III-12 of the Alternatives Development and Evaluation Technical Reference Document (Volume II).

- Basin proposed for handling excessive inflow due to the 2-year, 7-day storm event which will produce 6 inches of rain precipitation in the Sewanee area.
- Methodology utilized in the 201 Facilities Plan for estimating inflow volumes based on rainfall quantities is presented in the SSES Final Report.
- Storage requirements for nonoperation time of land application time is already accounted for in the volume of the facultative lagoon. This storage volume is separate from the flow volume of inflow that was to be handled by an equalization basin. Nonoperation time is taken to be 4 weeks; storage is required for 25 days (EPA -600/2-76-250, "Use of Climatic Data in Estimating Storage Days for Soil Treatment Systems"). This additional volume was estimated as 10,875,000 gallons (1,453,700 ft3). Therefore, the total volume of the lagoon was as follows:

  13,050,000 gal (30 days detention)
  10,875,000 gal (25 days storage)

  23,925,000 gal

  = 23.9 mg which leads to a 6 ft.
  lagoon on 12.24 acres

Comment: The cost-effectiveness analysis has not been completed strictly in accordance with the construction grant regulations (i.e. land can be appreciated at 3 percent per year); however, our calculations based on the EIS's raw capital and O&M costs support the selection of Alternative 7.

Response: Comment does not require a response.

4. Donald C. Bivens; Soil Conservation Service, U.S. Department of Agriculture. Letter dated October 15, 1981.

Comment: (This comment pertains to the Site Evaluation for Proposed Forest Spray Irrigation System document prepared by William E. Sopper of the Pennsylvania State University. A copy of this report appears in the Alternatives Development and Evaluation Technical Reference Document. However, the results of the evaluation were very important in the eventual selection of a spray irrigation site and ultimately in the selection of Alternative 7. Therefore, this comment appears here, as a comment on the DEIS.) The report referenced above states that much deeper profiles were found on the evaluated sites, than the typical profiles described in the 1958 Soil Conservation Service Soil Survey. The report contains no description of these deeper profiles. If indeed, the deeper soil profiles do exist, then these profiles should be described in the report. The report concludes that the depth of the soil profile is equal to the depth of material that can be penetrated by a power auger. This is not consistent with Soil Conservation Service procedures for determining soil depth.

Response: Soils in the proposed wastewater application areas have been mapped as Hartsell fine sandy loams and Muskingum stoney fine sandy loams. These soils are characterized by having depths to bedrock ranging from 2 to 4 feet.

The soil boring logs indicate relatively deep soils primarily associated with downslope topographic settings. Soils located on this landscape position, for the most part, do not fall within the range of characteristics for the Muskingum series (as previously mapped). The area of concern is those soils which formed on deep colluvium and now more closely resemble the description for the Jefferson series. This series often times has a moderately deep mineral or "C" horizon. The Garnerstown site evaluation resulted in even deeper or thicker "C" horizons, a result of widely variable colluvium deposits. Soils of this type more closely resemble the Jefferson series due to the deeper "C" horizons consisting of clay loam and silt loam textures. Soil boring depths are quite variable due to the different thickness of colluvium.

The natural soil profile does not extend to depths as indicated previously in the report. Soil auger borings, for the most part, penetrated some weathered rock land and at first glance closely resembled "C" horizon diagnostic properties.

The soil profile should only represent the organic and chemically altered mineral or "C" horizon which probably developed from the underlying weathered residuum. Since the boring techniques produced a much disturbed soil sample, precise differentiation between the "C" horizon and residuum could not be made. Therefore, soil boring logs are, to an extent, misleading in describing soil depths and major horizons.

The most recent taxonomic descriptions for the three soil series in the proposed land application areas - the Muskingum, the Hartsell and the Jefferson series - are provided as a supplement to this response and can be found at the back of this section. These taxonomic descriptions describe a typical soil profile and other soil characteristics for the three soil series.

Comment: The report prepared by Gannett Fleming Corddry and Carpenter, Inc. (refer to Sopper's Site Evaluation report) also contains an analysis of the storage capacity and percolation of the soils to a depth of 24 to 27 inches. The report, however, does not address the percolation rate of the substratum, nor the storage capacity that can be anticipated under field conditions during different seasons of the year. This needs to be done in order that actual storage volumes available on the site can be determined.

Response: Soil permeability tests were conducted at various depths to determine which horizons or zones would limit the downward movement of sewage effluent. Soils at both the Garnerstown and St. Marys sites are basically well drained, permeable fine sandy loams. The Hartsell and the Muskingum soil series are characterized by having blocky to subangular blocky structure. Soils having sandy loam textures with this type of structure will not have very slowly permeable subsoil horizons.

The proposed application rate is quite conservative in that it approximates normal cropland irrigation. Dr. Sopper's report indicates a somewhat slowly permeable B Horizon with a percolation rate of 0.24 in./hr. Percolation rates this slow will still greatly exceed the required permeability criteria associated with the proposed application scheme. Three inches of applied wastewater over a seven (7) day period translates to an average permeability of 0.018 in./hr., considerably less than the slowest measured permeability of 0.24 in./hr.

Effluent will not be applied so as to create a saturated condition, therefore the wastewater effluent should receive ample renovation prior to reaching any limiting horizon such as bedrock or seasonally high groundwater. Storage volumes should not be a major concern in this proposed application scheme. Wastewater application is a function of the hydraulic head gradient and the soil hydraulic conductivity. Regulating the application rate with sprinklers can prevent saturated conditions and allow the percolate to move through the profile and flow in the direction of the natural groundwater gradient. Unlike cropland irrigation, the rate of application will not be a function of storage volumes and moisture losses due to plant uptake and evaporation. The remaining volume of effluent not accumulated by the trees and shrubs or lost to evaporation will be relatively small but nearly renovated and available for percolation through the subsoils to a limiting horizon. The remaining wastewater effluent will be for the most part, renovated when it mixes with seasonally high groundwater or moves in saturated zones above bedrock.

Comment: Page IV-65, DEIS. (Impacts of the preferred alternative on soils.) The report does not contain an analysis of the anticipated impacts of the sprayed wastewater on either the existing vegetation or the soils. These evaluations need to be included in the report.

Response: Wastewater application rates are anticipated to be quite small in mixed hardwood forests. No adverse impacts are anticipated to the vegetative forest floor mat nor to trees and shrubs. Wastewater effluents have been applied to forest environments with little to no adverse impacts. Nutrient-rich effluent will result in possible rapid growth of weeds and could conceivably choke off new tree saplings if weed growth is not periodically checked by mowing. Increased concentrations of salts can conceivably lead to an alteration of soil structure with a resultant reduction in soil permeability and a possible reduction in the application rate. This situation would probably be quite remote due to the sandy loam texture of the soils. Periodic diagnostic soil tests are proposed to monitor adverse concentrations of nitrates, phosphates, trace elements and heavy metals.

5. Frank S. Lisella; U.S. Department of Health and Human Services. Letter of October 26, 1981.

Comment: The effect that large and/or long-term storm events will have upon the management and operation of the spray fields should be discussed.

Response: The proposed application scheme has ample storage at the lagoon to retain wastewater for at least 3 weeks in the event of prolonged rainfall and resultant saturated field conditions. Therefore, effluent will be stored and only applied during unsaturated conditions. Excess rainfall will only saturate the field and result in anaerobic conditions without leaching chemically bound nutrients.

Comment: What measures will be incorporated into the design and operation of the lagoon to prevent field spraying during frozen and/or saturated soil conditions?

Response: The high infiltration rates associated with porous and loosely structured debris laden forest soils will probably mean that the highly permeable surface horizon will be able to receive wastewater effluent for long periods of time. This will help to further extend the wastewater application period and reduce the requirement for off-site storage. Ample storage will exist at the lagoon to totally store wastewater for at least three weeks during frozen or saturated conditions.

Comment: It has been our experience that poor management of a spray irrigation field may lead to potential runoff and water quality problems. For this reason, the EIS should discuss the management aspects of maintaining necessary percolation and infiltration rates, suitable soil conditions and vegetative cover, and preventing surface compaction, clogging and matting.

Response: A wastewater application plan will specifically address the safe operation of the sites. This plan will state that irrigation in the woods will only be made during periods when the soil moisture is not at the saturation level. Wastewater application will not exceed the permeability of the most restrictive soil horizon except during dry periods when infiltration capacities will substantially exceed saturated hydraulic conductivities. The vegetative cover consisting of woody plants will experience rapid development and weeds will also react to the nutrient rich wastewater. Weeds will be cut and taken off site as well as selected trees. Trails should be cut in the woods in such a manner so as to limit disruption of the natural forest floor. Timbering and maintenance operations should be performed utilizing only track type equipment so as to minimize compaction and destruction of the forest floor debris. Diagnostic soil testing is also proposed to monitor adverse impacts to the soil environment such as the build up of heavy metals and trace elements. The concentration of salts will also be determined since salt effects soil structure and can result in changes to soil permeability.

Comment: For general protection of public health and safety, will the lagoon and spray irrigation areas be posted and fenced?

Response: Yes, for the protection of public health and safety, both the St. Marys and Garnerstown spray sites and the lagoon will be totally enclosed by fencing. In addition, a 200 foot natural (forested) buffer zone will be left intact surrounding the areas (see page III-3 of the DEIS). Also, signs indicating the locations of the spray sites and lagoon will be posted.

Comment: The potential vector problems that may be associated with the operation and maintenance of the lagoon and spray fields should be addressed. The wastewater treatment systems should be operated in such a manner as to prevent the increase of any vector populations that have the potential to cause vector-borne disease or nuisance problems. We suggest that you contact the local and/or State public health authorities for information on vector problems and control techniques in the project area.

Response: Because of the strength of the wastewater and the level of treatment afforded at the lagoon, vectors are not expected to be a major problem at either spray site. The probability that vectors (basically flies and mosquitos) will be attracted to the lagoon is high, however, relative to the spray sites. Should flies become a problem at either the lagoon or spray sites, periodic spraying can control propagation. Mosquito breeding at the lagoon site can be discouraged by periodically varying the level of the lagoon. The asphalt lining proposed for the facultative lagoon should discourage the attraction of rodents and other mammals. It has been found that if a lagoon is operated and maintained properly and if measures are taken regularly to discourage vectors, they will generally not be a problem. This has been the case in most of the lagoon sites visited in the State of Tennessee.

6. Jack W. Robinson, Attorney representing the Sisterhood of St. Mary. Letter of October 29, 1981.

Comment: The Sisterhood of St. Mary is strongly opposed to Alternative No. 7 for the following reasons:

a. "The information concerning land ownership in the documentation is deceptive as it fails to reflect that land immediately adjacent is already developed with privately owned residences in the drainage area of the lagoon and spray installations."

b. "A pasture owned by our client, where cattle (which are raised for food) graze, has a pond which would receive water from the proposed spray areas."

Since there are obviously other alternatives to Proposal No. 7, we respectfully request that Proposal No. 7 be rejected and that attention then be given to more appropriate ways to eliminating the wastewater problem, particularly those which would have less impact on the Sisterhood of St. Mary.

Response: The only homes adjacent to the spray sites are four homes located on University of the South property. These homes may or may not be affected by the proposed project. The potential that they will not be impacted is heightened by the fact that a 200 foot buffer zone of natural uncut vegetation will surround the potential spray and lagoon sites. This buffer zone will serve several purposes. First of all, it will act to eliminate any potential visual impacts to the surrounding area including these four homes and the property of the Sisterhood of St. Mary. Secondly, it will act to protect the health risks due to aerosol-borne pathogens. Finally, 200 feet of natural woodland, in addition to the wooded nature of the spray sites, will only serve to further renovate any excess runoff (should there be any excess) from application of the effluent.

In responding to the comment concerning the potential influence of the spray site on the down gradient farm pond on the Sisterhood of St. Mary property, if wastewater application should ever exceed the soil permeability resulting in runoff and overland flow of partially treated effluent, additional treatment will take place as the effluent travels across the above-mentioned grassland or wooded environment. Potential bacteria and virus problems will have already been minimized through disinfection. Nitrates and phosphates will probably be trapped in the vegetative cover and physically or chemically bound or transformed. Therefore, any effluent flowing over the several hundred feet upgradient of surface water sources will essentially be nearly renovated prior to entering any such sources. Additionally, it appears that the natural drainage pattern in the area of the sprayfield is not toward the above mentioned farm pond, but toward another tributary of Talleys Fork. Therefore, in the event that applied wastewater would leave the spray site, the farm pond of the Sisterhood would likely not receive wastewater runoff. It should also be noted that a comprehensive monitoring program in which ground and surface water quality will be monitored is a requirement of this EIS. Therefore any runoff from the spray site into adjacent waterways will be monitored and corrected, as appropriate.

7. E. C. Moore; U.S. Army Corps of Engineers, Nashville District. Letter of October 29, 1981.

Comment: The preferred alternative waste treatment system Alternative 7, involves replacing the existing STP with a combination storage pond/facultative lagoon with pretreated effluent spray irrigated at sites approximately 3000 feet west of the existing STP. Reference should be made to the holding capacity of the system during winter freeze conditions and in the event that maintenance is required.

Response: When determining the volume of the facultative lagoon, several assumptions were made:

a. Storage required for periods of non-operation of the land application was determined as 25 days according to EPA-600/2-76-250, "Use of Climatic Data in Estimating Storage Days for Soil Treatment Systems". This "25 days worth" of storage could also account for the storage required due to winter freeze conditions of the facultative lagoon. This storage is required for periods in which ice cover, ice breakup, or thermal (spring) overturn cause the lagoon to become anaerobic therefore needing time to become stratified again as a facultative lagoon.

b. Lagoon detention time = 30 days
Therefore, lagoon total volume is determined as:

30 days detention time V1 = 1,744,680 ft3 = 13,050,000 gal.

25 days storage V2 = 1,453,700 ft3 = 10,875,000 gal.

3,198,380 ft3 23,925,000 gal.

= 23.9 mg

For 6 ft. depth

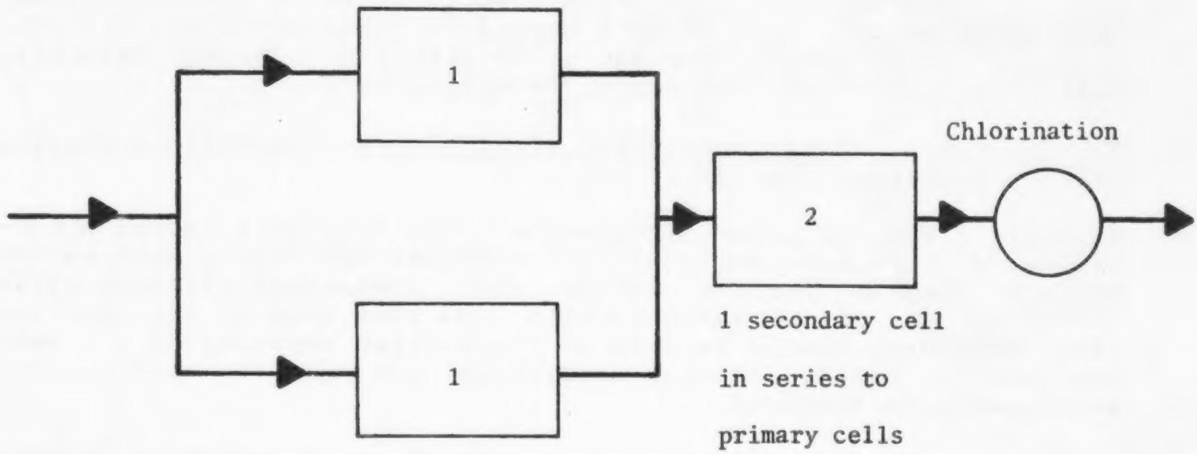
Surface area => 12.24 acres

Maximum solids per day

$$\frac{\text{3160 pop. X 0.17 \#BOD/person/day}}{\text{12.24 acres}} = \text{44 \#BOD/acre/day}$$

Proposed Lagoon System - 3 cells

2 Primary cells in parallel



Assuming BOD loading for primary cells must be less than than 35 #/acre/day

V1 total = 2 (1,085,500 ft3) = 2,171,000 ft3
= 2 (8,120,626 gal) = 16.24 mg

V2 = 7.68 mg

Comment: Page II-7. Overland flow is considered unmanageable because of the sloping terrain, however, some of the terrain is within the 9% slope limitation according to Table A-2a.

Response: As noted in the preceding sentence on page II-7, spray irrigation appears to be the only viable land application option in the Sewanee area. Spray irrigation, not overland flow, is the proposed form of land application in the EIS.

Comment: Page II-19, II-20. Table II-4 and II-5 footnotes refer to Table IV-4 for information on spray sites. Table IV-4 lists cultural sites in the area.

Response: Footnotes to Tables II-4 and II-5 should refer to Table II-6 for information on spray sites.

Comment: Page III-3. Land Application Sites, paragraph 2, lines 3, 4, 5. Same as comment on overland flow above.

Response: Dr. Sopper's report indicated that the sites were level to gently sloping (less than 15% slope) and generally suitable for spray irrigation. As indicated above, the EIS proposed action involves spray irrigation as the land application method and in accordance with EPA Publication 625/1-77-008, "Process Design Manual of Land Treatment of Municipal Wastewater", wastewater can be applied by spray irrigation on non-cultivated lands with slopes of less than 40%.

Comment: Page IV. Reference to the detailed soil survey should be supplemented by data indicating the suitability of the soils for spray irrigation.

Response: Dr. Sopper's report discusses in detail the physical and chemical characteristics of the soils at the proposed sites with respect to their ability to accept and treat wastewater effluent. Specific reference is made to infiltration percolation and chemical bonding potential. Dr. Sopper's report can be found as an appendix to Volume II, Alternatives Development and Evaluation Technical Reference Document.

Comment: Page IV. Odor, paragraph 3 was anaerobic lagoon considered? Aerators could be added to reduce odor.

Response: An aerobic lagoon was not considered because it is "best suited for treating soluble wastes in wastewaters relatively free of suspended solids" (EPA Technology Transfer, "Process Design Manual - Wastewater Treatment Facilities for Sewered Small Communities").

Aerators could be added and therefore make the system one with aerated facultative ponds (partially mixed aerated ponds) where only the upper zone is aerated by diffusers or mechanical aerators. This, however, would result in higher capital and O&M

costs which would reduce the cost-savings inherent in the low-energy requirements of a non-aerated facultative lagoon.

As far as odors are concerned, a properly operated facultative lagoon will generate no odors except possibly spring overturn odor that occurs due to anaerobic conditions resulting from the pond freezing over in the winter. This occurrence is for a short time (until the lagoon "recovers" and becomes a stratified facultative lagoon again), if at all, considering the climatic conditions in Sewanee, Tennessee. If this is a major concern, then the option of aerating the upper zone can be considered. It should be noted, though, that the facultative lagoon was also proposed over an aerobic or completely mixed aerated pond because of its capabilities to reduce sludge production resulting from its anaerobic bottom layer.

Comment: Page IV-1. Under NEPA Guidelines Section 1502.17, the experience of the preparers should be included.

Response: The qualifications and professional disciplines of those persons in the List of Preparers, pg. VI-1, Chapter VI in the Draft EIS will be included in the Final EIS List of Preparers.

Comment: Page A-10. The table heading is Overland Flow Spray Irrigation, is this correct?

Response: No. The table heading should read Soil Suitabilities for Land Treatment.

8. James H. Lee; U.S. Department of the Interior. Letter of October 30, 1981.

Comment: We suggest that the analysis of potential impacts of land application by spray-irrigation methods should include more adequate consideration of the fate of nitrates and any other constituents little affected by traveling a short distance through soils. The type (s) of crops under consideration for the irrigated areas should be assessed for their nitrate uptake capacity, if this is fundamental to the plan.

Response: Undisturbed forest soils have been shown to have a tendency to accumulate, store and redistribute nutrients. Many of these soils have a strong capacity to retain nitrogen due to wide carbon/nitrogen ratios associated with the organic forest mat as well as high cation-exchange-capacities (C.E.C.). Treatment in the lagoon is expected to result in sizeable nitrogen concentration reductions, less than 10 mg/l. When the effluent is applied to the forest environment, additional losses in nitrogen will take place. The proposed land treatment fields are to periodically rest in order to promote aerobic conditions in the soil environment. This action will help to develop the conditions necessary for denitrification, the chemical or biochemical reduction of nitrate or nitrite to gaseous nitrogen.

The total nitrogen for the pretreated effluent is anticipated to be less than 10 mg/l, a concentration acceptable for drinking water. Additional nitrogen will be removed by the land treatment process, in that there will be a significant uptake of nitrates by woody plants. Denitrification will further reduce the nitrates to nitrogen gas in the aerobic, organic-rich soil environment. During the winter months when biological activity is reduced, considerable amounts of nitrate-nitrites will be absorbed by organic complexes. Many of these nutrients will then be made available to plants for the next growing season.

__Comment:__ The fate of effluent that reaches the resistent sandstone should be discussed; presumably it would move downgradient along the top of the sandstone. A map showing sufficient geologic detail to permit assessment of the possibility of effluent seepage to drainage courses should be included.

__Response:__ The proposed wastewater application techniques considers maximizing both infiltration of effluent by surface soils and accumulation of wastewater nutrients by young trees. Renovation of the effluent by the soil will be aided by physical uptake of nutrients and wastewater by mixed hardwood trees. This process will result in a sizeable reduction in volumes of wastewater that will percolate through the soil profile. Both the Harsell and Muskingum soils have relatively high cation-exchange-capacities, an indicator of the soils ability to absorb ions. Additional treatment of wastewater should take place as the effluent percolates through the profile until it reaches a less chemically active residuum (saprolite). This renovated effluent will then combine with a nearby unconfined or perched aquifer and move out of the region in the direction of the natural groundwater gradient. At this point in the EIS process, no additional maps will be drafted.

__Comment:__ A specific omission regarding endangered species has been noted. The DEIS does not address how Section 7(C) of the Endangered Species Act of 1973, as amended, are being fulfilled pertaining to the completion of a biological assessment. Once the biological assessment is completed, the Federal agency must determine if the proposed activities (alternatives in the DEIS) may affect listed or proposed species and initiate consultation with the Area Manager, U.S. Fish and Wildlife Service, Asheville, N.C., if a determination of "may affect" is made. It should be pointed out that positive as well as adverse affects require consultation. In reviewing the DEIS, a conclusion of beneficial "may affect" seems to have been made regarding at least one mussel species, thus indicating the need for initiating consultation.

__Response:__ Extensive discussions have been held between the U.S. Fish and Wildlife Service (FWS), EPA, and EPA's consultants concerning the approach to be taken in evaluating protected species and coordinating Section 7(C) activities. A three-step process was agreed upon for the EIS. First, all protected species known or suspected to be present in the study area should be reviewed in detail to confirm or deny possible presence and impact from the project. If this review indicates no presence or impact, then no further action would be necessary. However, if the review does not eliminate all species, then one of the two remaining steps could be required. Either biological assessment surveys could be required to demonstrate the presence or absence of the species in question or the project could assume that the species in question were present, and proceed with the required analyses. These analyses include estimates of secondary impacts, cumulative effects and efforts to be taken to eliminate, reduce, or mitigate any adverse impacts.

This process was initiated with a letter to FWS on December 31, 1980 requesting a list of endangered and threatened species within the study area. The FWS responded with a letter on January 12, 1981 listing 7 endangered species, 1 threatened species, 3 species formerly proposed for endangered status, 2 species formerly proposed for threatened status, and 2 species on the Smithsonian Institution's list of threatened plants. These species were reviewed along with species listed by the Tennessee Heritage Program (THP) during the EIS process. Particularly helpful in this review process were the location maps and habitat descriptions provided by the THP. None of these species are known to occur in the areas of impact for the proposed alternative (No. 7), and habitat conditions make their presence in these areas extremely unlikely. These species are discussed on pages IV-16, IV-20, IV-21, IV-50, and IV-51 of the Draft EIS. The FWS comment indicates that an assessment was made that the preferred alternative (No. 7) "may affect" at least one mussel species. The point is made that even a beneficial "may affect" requires the initiation of a formal consultation. No "may affect" conclusion was reached for any federally protected species under the preferred alternative. On page IV-50 possible adverse impacts to mussel species are discussed for Alternative 3. The possible beneficial "may affect" discussed on that page is for the Tennessee Cave Salamander (Gyrinophilus palleucus). This species is listed only as threatened on the state list, and the beneficial impact is very remote under the preferred alternative.

Comment: Although the document (DEIS) includes an extensive listing of area historic and cultural resources, there is no discussion of the significance of the resources or the effect on the resources of the various alternatives.

Response: Alternatives 1, 2, 5, 6 and 7 would not be expected to have any negative impact on area historic and cultural resources due to pipeline construction. Extensive construction planned for Alternatives 3 and 4, however, have the potential to impact nearby historic resources. Impacts from construction include destruction resulting from digging, soil erosion, and decrease in site visitors due to noise. Spray sites in Alternatives 5, 6, and 7 all are adjacent to cultural or historic overlooks. Generally, the only impacts will be aesthetic, and even these are highly potential. The spray sites will not be seen because of the 200-foot buffer zone surrounding the sites. Noise may be a nuisance during the construction phase, but is not expected to be a problem during the operation of the sites. Odors at the lagoon site may be a problem, but these odors would be localized and may not impact the overlook. Additionally, if the plant is operating properly odors will be minimal.

Comment: We request that the State Historic Preservation Officer (SHPO) be consulted concerning the survey for, and evaluation of, cultural resources in the project area. A letter documenting that consultation should be included in the final statement.

Response: No construction on the preferred alternative will take place until historic and archaeologic surveys of the area are completed to the satisfaction of the SHPO. The SHPO for Tennessee is the Executive Director of the Tennessee Historical Commission. A copy of the Draft EIS was sent to the Executive Director, as well as the State Division of Archaeology (State Archaeologist) and the state clearing house for review and comment.

Comment: On page IV-54, the statement mentions that tentative main routes for Alternatives 3 and 4 could result in negative impacts to historic sites. Should either of these alternatives be selected, we suggest close consultation with the SHPO to mitigate any negative impacts.

Response: Since neither Alternative 3 nor 4 was selected as the preferred alternative, it is not necessary to consult with the SHPO to mitigate any potential negative impacts.

Comment: The St. Marys spray site, utilized for the preferred alternative (7), is adjacent to an existing Civil War overlook. We suggest close consultation with the SHPO to minimize effect.

Response: Close consultation with the SHPO will take place during design and construction of the project to minimize any effect on the overlook. Although any possible visual impacts to the scenic overlook at the War Memorial will be eliminated by the 200-foot buffer zone of uncut vegetation which will surround the sprayfield site, no construction will take place until the appropriate state offices (including the SHPO) have been satisfied with the measures selected to mitigate adverse impacts on the overlook.

Comment: The St. Marys spray site is also within one mile of the Barnes Branch of Lost Cove, an area listed on page IV-33 as containing popular swimming holes. The statement suggests that the wooded nature of the St. Marys site will prevent the occurrence of airborne pathogens. We suggest that the area be monitored to assure that airborne or water-carried pathogens do not reach this adjacent recreation area.

Response: The purpose of the monitoring system at the spray sites is to detect any contamination of ground and surface waters early, before that contamination reaches any outlying or adjacent areas. However, Barnes Branch of Lost Cave is located in the Barnes Branch drainage area which does not serve as a drainage area for the proposed spray sites. Therefore, impacts to surface water quality or uses in Barnes Branch as a result of the EIS proposed action are not expected. With regard to aerosols, the recreation area is approximately one mile from the proposed spray sites. The sites will be surrounded by a 200 foot buffer zone of uncut vegetation. Coupled with the selection of appropriate spray systems, the effect of aerosols on the Barnes Branch area is expected to be sufficiently mitigated.

Response to comment by J. R. Wauford
in letter of September 16, 1981

SEWANEE, TENNESSEE WASTEWATER FACILITIES EIS
PROPOSED ALTERNATIVE - DESIGN CRITERIA

I. Land Area Requirement Determination

A. Total design wastewater flow = 436,900 gpd

B. Application rate for spray irrigation = 3 in./wk.

C. Used nomograph from "Process Design Manual for Land Treatment of Municipal Wastewater" EPA 625/1-77-008 (Pg. 3-11) with the assumptions of a 200 ft. buffer zone and 25 weeks nonoperating time. Therefore land area requirements approximately 130 acres which includes land for application, roads, storage, and buildings.

II. Treatment Facilities

A. Equalization Basin

- Volume of 497,000 gal. based on a 2-yr. return frequency for the 7-day rainfall event
- Asphalt lined earthen basin (SWD = 11 ft., width = 40 ft., and length = 120 ft.)
- Mixing to be provided by 3 aerators (15 HP with Mooring)

B. Preliminary Treatment

- Sized to handle flows = 0.435 X 2.5 = 1.1 MGD where Q avg. = 0.435 MGD

C. Sludge Drying Beds

- Surface area = 9,000 ft^2

D. Chlorination Facilities

- 2 contact tanks with a volume of 1520 cf each and detention time = 30 min.
- Chlorine feed equipment to provide a dosage of 8 ppm or 29 lbs./day for Q avg. and 72 lbs./day for Q = 1.1 MGD

E. Control Building and Laboratory (same as 201 Study)

F. Pump Station at existing treatment plant site

- Pump size = 2.5 X .435 = 1.1 MGD
- Efficiency of pump = 80%
- Power Factor = 0.90
- Total head loss = 80 feet

G. Conveyance to spray site

- 8" diameter force main with length of 6,500 ft.

H. Facultative Lagoon (includes storage)

- Biological lagoon to be designed with adequate freeboard to provide storage during inclement periods of operations
- Storage volume for 25 days (Refer to EPA 600/2-76-250, "Use of Climatic Data in Estimating Storage Days for Soil Treatment Systems")
- Nonoperation time for the year = 4 weeks
- Lagoon detention time = 30 days
- Basin to be asphalt lined with a 6 ft. depth and a total volume of 2.4 MG (12.25 acres)
- Suggest a 3 cell lagoon system (includes 2 primary cells)

III. Spray Irrigation Facilities (Q = .436 MGD, Land Area = 165 acres, and application rate = 3 in./wk.)

A. Distribution Pumping

- Structure built into dike of storage reservoir (facultative lagoon)
- Continuously cleaned water screens
- Normal standby facilities for pumping equipment
- Piping and valves within structure
- Design flow = 436,900 gpd

B. Distribution, solid set spray (Buried)

- Lateral spacing, 100 ft.
- Sprinkler spacing, 80 ft. along laterals
- 5.4 sprinklers per acre
- Application rate = 0.20 in./hr. (maximum)
- 16.5 gpm flow to sprinklers at 70 psi
- Flow to laterals controlled by hydraulically operated automatic valves
- Laterals buried 18 in., mainlines buried 36 in.
- All pipes 4 in. in diameter and smaller are PCV and larger pipe is asbestos cement

C. Service Roads

- 12 ft. roads with gravel surface, around perimeter and within

D. Fencing

- 4 ft. stock fence around perimeter of area

E. Monitoring Wells

- 6 wells (2 background, 3 perimeter, 1 on-site)
- 1 Surface water sampling site

Response to comment concerning deeper profile descriptions by Donald C. Bivens of the SCS in letter of October 15, 1981

Established Series
Rev. BJP
11/1/69

MUSKINGUM SERIES

The Muskingum series is a member of the fine-loamy, mixed, mesic family of Typic Dystrochrepts. These soils have brownish silt loam A horizons and yellowish brown silt loam B horizons. They contain coarse fragments throughout and bedrock is at 20 to 40 inches.

Typifying Pedon: Muskingum silt loam - forested
(Colors are for moist soil.)

A1 -- 0-3" -- Very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable; many roots; 10 percent coarse fragments; medium acid; clear wavy boundary. (2 to 5 inches thick)

A2 -- 3-11" -- Brown (10YR 5/3) silt loam; weak fine granular and weak fine subangular blocky structure; very friable; common roots; 10 percent coarse fragments; strongly acid; clear wavy boundary. (2 to 8 inches thick)

B2 -- 11-24" -- Yellowish brown (10YR 5/6) channery silt loam; moderate fine and medium subangular blocky structure; friable; few roots; 20 percent coarse fragments; strongly acid; gradual wavy boundary. (8 to 18 inches thick)

B3 -- 24-32" -- Yellowish brown (10YR 5/6) channery silt loam; weak fine and medium subangular blocky structure; friable; 30 percent coarse fragments; strongly acid; gradual wavy boundary. (0 to 12 inches thick)

C -- 32-35" -- Fractured brown and gray horizontally bedded soft siltstone and fine grained sandstone and 10 to 15 percent fines like that in the B3 horizon. (0 to 10 inches thick)

R -- 35" -- Fractured siltstone and fine grained sandstone.

Type Location: Raleigh County, West Virginia; 3.5 miles east of Arnett on W. Va. Route 3, then north 3/4 mile on W. Va. Route (3/10); 50 yds. east of road.

Range in Characteristics: Thickness of the solum ranges from 16 to 36 inches. Depth to hard bedrock is 20 to 40 inches. The B and C horizons are strongly or very strongly acid except where the soil has been limed. Coarse fragments of shale, siltstone or sandstone range from 10 to 30 percent by volume in all parts of the B horizon and are more than 35 percent in the C horizon. The control section averages less than 35 percent coarse fragments. The Ap horizon ranges from dark brown (10YR 3/3) through strong brown (7.5YR 5/6). The A1 horizon is less than 6 inches thick and commonly is very dark grayish brown or dark brown. The A horizon is silt loam, loam or fine sandy loam and may be channery. It is friable to very friable. The B2 horizon ranges from dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6). It is silt loam or channery silt loam. It has weak or moderate, fine or medium, subangular blocky structure. A few discontinuous clay films are in some pedons. The C horizon is yellowish brown (10YR 5/4) or brown (10YR 5/3 or 7.5YR 5/4). It is channery or very channery loam or silt loam.

Competing Series and Their Differentiae: The Citico, Kitsap and Sadie series are members of the same family. The Citico soils have thicker sola, bedrock is at depths of more than 40 inches and they formed in residuum weathered from phyllite. Kitsap and Sadie soils lack bedrock within depths of 40 inches. Other related soils are in the Berks, Brandywine, Dekalb, Garmon, Gilpin, Lordstown, Parker, Steinsburg and Westmoreland series. Berks, Brandywine, Dekalb, Parker and Steinsburg soils average more than 35 percent coarse fragments within the control section. Garmon soils have higher base saturation. Gilpin and Westmoreland soils have argillic horizons. Lordstown soils average less than 18 percent clay within the control section.

Setting: Muskingum soils are mainly on rugged topography of dissected plateaus. Slope gradients range from 5 to 70 percent and are mostly more than 20 percent. The soil formed in residuum weathered from interbedded siltstone, sandstone and shale. Mean annual precipitation ranges from 35 to 55 inches and mean annual air temperatures from 50° to 57° F.

Principal Associated Soils: These are the competing Dekalb, Gilpin and Westmoreland soils and the Ernest, Ramsey, Rayne, Shelocta and Upshur soils. All of these except the Ramsey soils have argillic horizons. The Ramsey soils have bedrock at less than 20 inches.

Drainage and Permeability: Runoff is medium to high. Permeability is moderate.

Use and Vegetation: Gentle slopes are used for growing corn, wheat and hay. Most areas are in mixed forest of oaks, yellow poplar, hickory and maple.

Distribution and Extent: West Virginia, Virginia, Pennsylvania, Ohio, Kentucky, Indiana, Illinois and Tennessee. The series is of large extent.

Series Established: Monroe County, Indiana, 1922.

Remarks: This description generally conforms with the concept established for the Muskingum series in the "Report on Classification into Series of Certain Soils Derived from Acid Gray Sandstones and Shales in Eastern United States", by R. W. Simonson, 8/24/62. Most of the soils mapped in the Muskingum series in W. Va. contain less than 35 percent coarse fragments in the control section and it is believed that most of the soils mapped in the Muskingum series in the other states listed under distribution are within the concept of this description. However, some of the soils included in the Muskingum series in other states contain more than 35 percent coarse fragments and would be within the current concept of the Berks series.

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Established Series
Rev. CLB:GWH
1/79

HARTSELLS SERIES

The Hartsells series consists of moderately deep, well drained, moderately permeable soils that formed in loamy materials from acid sandstone containing thin strata of shale or siltstone. These soils are on nearly level to moderately steep ridges and upper slopes of hills and mountains.

Taxonomic Class: Fine-loamy, siliceous, thermic Typic Hapludults.

Typical Pedon: Hartsells fine sandy loam--pasture.
(Colors are for moist conditions unless otherwise stated.)

Ap--0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; 10 percent by volume 1/4 inch to 1 inch angular fragments of sandstone; strongly acid; clear smooth boundary. (4 to 6 inches thick)

A2--5 to 9 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; 10 percent by volume 1/4 inch to 3 inch angular fragments of sandstone; strongly acid; clear smooth boundary. (4 to 6 inches thick)

B1--9 to 13 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; common fine roots; few fine fragments of sandstone; most sand grains coated with clay; very strongly acid; gradual smooth boundary. (0 to 6 inches thick)

B21t--13 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam; weak and moderate medium subangular blocky structure; friable; common fine roots; few fine fragments of sandstone; thin continuous clay films on faces of most peds; very strongly acid; gradual smooth boundary. (4 to 8 inches thick)

B22t--20 to 30 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of most peds; 10 percent by volume 1/2 inch to 2 inch angular fragments of sandstone; very strongly acid; gradual smooth boundary. (4 to 10 inches thick)

B3--30 to 36 inches; yellowish brown (10YR 5/6) sandy loam, texture coarsens with increasing depths; weak medium subangular blocky structure; very friable; 30 percent by volume 1/2 inch to 2 inch angular fragments of sandstone; sand grains coated with clay; very strongly acid; abrupt boundary. (0 to 6 inches thick)

R--36 inches; acid sandstone.

Type Location: Marshall County, Alabama; Land Mountain NW Corner of NW1/4SE1/4sec. 24, T. 6 S., R. 3 E. Very near the center of the section.

Range in Characteristics: Depth to bedrock and solum thickness range from 20 to 40 inches. The amount of coarse fragments, chiefly sandstone, ranges from none to 15 percent in any horizon, except the B3 and C horizons which range up to 35 percent. Where the soil has not been limed, it is extremely acid through strongly acid throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 6. Some pedons have a 1 to 4 inch A1 horizon that has hue of 10YR or 2.5Y, value of 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4 through 6, and chroma of 3 through 8. Texture of the A horizon is fine sandy loam or loam.

The B1 horizon, where present, has hue of 10YR or 7.5Y, value of 4 or 5, and chroma of 4 through 6. Texture is sandy loam or loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6, and the lower part commonly is mottled in shades of red, brown, or yellow. Texture is sandy loam, loam, sandy clay loam, or clay loam. The average clay content of the upper 20 inches of the B2t horizon or to bedrock commonly is 16 to 24 percent, but ranges from 16 to 35 percent.

The B3 or C horizon is similar to the B2t horizon in color and texture.

Competing Series: These are the Apison, Cahaba, Cowarts, Durham, Emporia, Euharlee, Granville, Kempsville, Linker, Marvyn, Nauvoo, Nectar, Pirum, Spadra, and Suffolk series. All except Linker and Pirum soils have bedrock at depths of greater than 40 inches. Linker soils have Bt horizons of 5YR or 2.5YR hue. Pirum soils have irregular lower boundaries over fractured or tilted sandstone.

Geographic Setting: Hartsells soils occur on broad smooth plateaus, mountaintops, or hilltops. Slopes between 3 and 8 percent are dominant but the extreme range of slope is 2 to 25 percent. The soil formed in moderately coarse to medium textured materials. The country rock consists of acid hard sandstone containing thin strata of shale or siltstone in some places. Near the type location the average annual air temperature is 61° F. and the average rainfall is 56 inches.

Geographically Associated Soils: These include the competing Linker series and the Albertville, Crossville, Enders, Hector, Townley, and Wynnville series. Albertville, Enders, and Townley soils have more than 35 percent clay in their control sections. Crossville and Hector soils lack argillic horizons. Wynnville soils have a fragipan.

Drainage and Permeability: Well drained; medium runoff; moderate permeability.

Use and Vegetation: Cotton and corn are the major crops; minor crops are oats, sorghum, cowpeas, soybeans, sweet potatoes, Irish potatoes, hay, orchards, and vegetables. Some acreage is in pasture. More than one-fourth of the soil is forested; second-growth white, red, post, black, and chestnut oaks, tulip poplar, blackgum, and hickory and some pines are on areas that have remained continuously in forest, but loblolly and shortleaf pines are the principal cover in abandoned cropland and pasture.

Distribution and Extent: Cumberland Plateau in Alabama, Georgia, Kentucky, and Tennessee; the Boston Mountains and adjoining ridges in Arkansas and possibly Oklahoma. The series is of large extent.

Series Established: Cherokee County, Alabama; 1924.

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Established Series
Rev. JHH:RED
2/79

JEFFERSON SERIES

The Jefferson series consists of deep, well-drained soils on mountain sides and footslopes. Permeability is moderately rapid. Slopes range from 5 to 60 percent.

Taxonomic Class: Fine-loamy, siliceous, mesic Typic Hapludults.

Typical Pedon: Jefferson gravelly loam--on a convex 30 percent slope on the lower part of a steep mountain side in woods.
(Colors are for moist soils.)

A1--0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly loam; moderate fine granular structure; very friable; many roots; 20 percent sandstone fragments; medium acid; abrupt smooth boundary. (2 to 5 inches thick)

A2--3 to 10 inches; brown (10YR 5/3) gravelly loam; weak fine granular structure; very friable; many roots; 15 percent sandstone fragments; medium acid; clear smooth boundary. (4 to 9 inches thick)

B1--10 to 17 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine subangular blocky structure; friable; many roots; 15 percent sandstone fragments; strongly acid; clear smooth boundary. (0 to 10 inches thick)

B21t--17 to 30 inches; strong brown (7.5YR 5/6) gravelly heavy loam; moderate medium subangular blocky structure; friable; common roots; many thin clay films; 15 percent sandstone fragments; very strongly acid; gradual smooth boundary. (10 to 30 inches thick)

B22t--30 to 43 inches; strong brown (7.5YR 5/8) gravelly heavy loam; few fine distinct yellowish brown (10YR 5/4) and yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common thin clay films; 25 percent sandstone fragments; very strongly acid; gradual smooth boundary. (10 to 25 inches thick)

B3--43 to 50 inches; strong brown (7.5YR 5/6) very gravelly sandy loam; common fine distinct yellowish brown (10YR 5/4) and yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; 40 percent sandstone fragments; strongly acid; gradual smooth boundary. (0 to 15 inches thick)

C--50 to 65 inches; mottled reddish brown (5YR 5/4) and light yellowish brown (10YR 6/4) very gravelly sandy loam; massive; friable; 60 percent sandstone fragments; very strongly acid.

Type Location: Harlan County, Kentucky; 150 feet north of U. S. Highway 119, near borrow pit, 5 1/2 miles northeast of Harlan, about 1 mile east of Rosspoint.

Range in Characteristics: Thickness of the solum ranges from 40 to 60 inches. Content of rock fragments of sandstone range from 5 to 35 percent to a depth of about 3 feet, and below 3 feet from 20 to 80 percent. Some areas are stony to extremely stony. The soil ranges from strongly to very strongly acid, except the A horizons range from very strongly acid to neutral.

The A1 horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. The A2 horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. They are loam, fine sandy loam, or sandy loam, and gravelly or cobbly analogues.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have mottles in shades of brown, yellow, and red, and the lower part shades of gray. It is loam, sandy clay loam, clay loam, or gravelly and cobbly analogues. Some pedons have B1 horizons. Some pedons have B3 horizons similar to the C horizon.

The C horizon is in shades of brown, red, or gray, and are usually mottled. It is gravelly or channery analogues of sandy loam, fine sandy loam, sandy clay loam, or clay loam. Some pedons have a IIC horizon, below a depth of about 40 inches, that are from shaly material with a higher content of clay.

Competing Series: These are the Lily, Lonewood, Marr, Riney, Sassafras, and Sunnyside series. Lily soils have bedrock at less than 40 inches. Lonewood, Marr, and Sassafras soils lack coarse fragments in the solum. Riney and Sunnyside soils have B horizons with hue redder than 7.5YR.

Geographic Setting: Jefferson soils are on steep mountain sides and footslopes, often below sandstone escarpments, with slopes ranging from 5 to 60 percent. These soils formed in colluvium from soils formed in residuum of acid sandstone, shale, and siltstone. Near the type location the average annual precipitation is about 49 inches and the average annual temperature is about 57° F.

Geographically Associated Soils: These are the competing Clymer and Shelocta series and the Dekalb, Gilpin, Muse, Ramsey, and Whitley series. Dekalb and Ramsey soils lack argillic horizons. Muse soils have more clay and less sand and Whitley soils have more silt and less sand than Jefferson soils.

Drainage and Permeability: Well drained with rapid or medium runoff, depending on slope. Permeability is moderately rapid.

Use and Vegetation: Most areas are in forest but less steep areas are used mainly for pasture and crops. The forest vegetation is chiefly yellow poplar, upland oaks, Virginia and shortleaf pine, hickory, and laurel.

Distribution and Extent: Southern Kentucky, Tennessee, and Virginia. The series is extensive.

Series Established: Reconnaissance Survey of Southwestern Pennsylvania; 1909.

Remarks: The Jefferson series formerly included Paleudults. These are excluded by this description of the Jefferson series. Mineralogy data for some sampled sites in Tennessee and three in southern Kentucky show that the 20 to 200 micron fraction is siliceous. Three sites in northern and eastern Kentucky are mixed for which the Rigley series has been established.

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D. RESPONSES TO ORAL COMMENTS RECEIVED AT THE PUBLIC HEARING

Oral comments received at the Public Hearing are indexed in Part B of this Section. All of these comments were responded to satisfactorily at the Hearing and those responses can be found in the transcript of the Public Hearing in Section VI of this document. Therefore, it is not considered necessary to respond in any way to those comments in this Section.

V. REVISIONS TO THE DRAFT EIS AND ADDITIONAL INFORMATION

Errata

Comments received concerning the Draft EIS revealed some corrections which were needed to rectify errors in the report. Below, the correction, location in the text, and person or agency making the comment are given.

Page IV-28, Third full paragraph, line 4	Last two sentences under "University of the South Financial Analysis", beginning with "It is the fourth..." will be omitted.	Dr. Charles Baird, University of the South
Page II-19, II-20	Footnotes for Tables II-4 and II-5 should refer to Table II-6 for information on spray sites.	E. C. Moore, U.S. Army Corps of Engineers, Nashville District
Page A-10	Table heading should read "Soil Suitabilities for Land Treatment".	E. C. Moore, U.S. Army Corps of Engineers, Nashville District

VI. TRANSCRIPT OF PUBLIC HEARING HELD ON OCTOBER 20, 1981

The following is the transcript of the Public Hearing for the Sewanee DEIS held in Sewanee on October 20, 1981.

TRANSCRIPT SUMMARY OF THE PUBLIC HEARING ON THE SEWANEE, TENNESSEE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The Public Hearing on the Draft Environmental Impact Statement (DEIS) for proposed wastewater treatment and disposal facilities for the town of Sewanee, the University of the South, and surrounding areas of Franklin County, Tennessee was held on October 20, 1981 at Cravens Hall, University of the South. The meeting began at approximately 7:30 p.m. (Central Daylight Time) with approximately 50 persons in attendance. Presiding at the meeting were Mr. John E. Hagan, III, Chief, EIS Branch with U.S. EPA in Atlanta; Mr. Robert Howard, Chief, EIS Preparation Section, U.S. EPA, Atlanta; and Mr. Ronald Mikulak, Sewanee, TN EIS Project Officer, U.S. EPA, Atlanta.

Introductions and opening remarks were heard by Mr. Hagan. He began by recognizing the presence of several state, local and University officials. They were Mr. Richard G. Threadgill and Mr. Donald Gregory of the Tennessee Division of Construction Grants and Loans; Mr. Arthur M. Schaefer, Provost, University of the South; Mr. Edmund Kirby-Smith, President, Sewanee Utility District; and Mrs. Ina M. Myers and Mr. Douglas Paschall, members of the Utility District.

In continuing his opening remarks, Mr. Hagan stated that the purpose of the meeting was to receive public and other agency comments on the wastewater management proposals in the DEIS for Sewanee, TN. He proceeded to give a brief history of the project beginning with preparation in 1976 of the 201 Wastewater Facilities Plan for the Sewanee Utility District by J. R. Wauford & Company, Consulting Engineers of Nashville, TN. Preparation of the EIS was authorized by the Clean Water Act and the National Environmental Policy Act. The Clean Water Act enables EPA to fund up to 75 percent of eligible costs for planning, design and construction of wastewater facilities. The planning phase of this process results in the preparation of a document known as a facilities plan. In this instance, the Sewanee Utility District has been designated as the local agency responsible for facilities planning in this area. NEPA requires federal agencies to prepare EIS's on major federal actions which significantly affect the quality of the human environment. Because of the environmental complexities of the water quality issues involved in this project, EPA determined that this was a major federal action significantly affecting the quality of the human environment and decided to prepare an EIS. In October, 1977, a Notice of Intent to prepare an EIS was issued. This public hearing is being held to receive public comments on the Draft EIS, pursuant to the guidelines of the President's Council on Environmental Quality and the Rules and Regulations of the Environmental Protection Agency with regard to preparing EIS's. The DEIS and Facilities Plan are discussed in a public forum to encourage public participation in the federal decision-making process and to develop improved public understanding of federally-funded projects. The DEIS was made available to the public and to the EPA Office of Federal Activities and to other federal and state agencies on September 2, 1981 and was listed as being available for public review in the Federal Register on September 11, 1981. The DEIS comment period will extend to October 30, 1981. The comments received during the Public

Hearing and during the comment period will be incorporated into the Final EIS.

Mr. Hagan's remarks were followed by a description of the project itself by Mr. Mikulak. As a basis for describing the project, Mr. Mikulak utilized a handout distributed at the Hearing. This handout summarized the Draft EIS into approximately 10 pages. Mr. Mikulak began his presentation by briefly discussing the purpose and background of the EIS. In addition he reviewed the problems and issues which resulted in preparation of the EIS (particularly the water quality issues and the nitrogen standard), the 201 Facilities Plan preferred alternative, and the seven wastewater management alternatives developed by the EPA consultants, Gannett Fleming Corddry and Carpenter, Inc. of Harrisburg, Pennsylvania and Claude Terry and Associates, Inc. of Atlanta, Georgia. Mr. Mikulak reviewed the present method of wastewater treatment and disposal in the study area, and described in detail the Draft EIS preferred alternative and its pros and cons. This alternative consists of replacing the existing sewage treatment plant (STP) with a combined storage pond/facultative lagoon at the proposed spray site and pretreated effluent be spray irrigated at the St. Marys and Garnerstown sites approximately 3000 feet west of the existing STP. Mr. Mikulak discussed the reasoning for implementation of a monitoring program for the proposed system, and referred to the suggested monitoring program developed in the Draft EIS. Mr. Mikulak ended his comments by expressing his thanks and appreciation for the time and effort expended by the EIS Community Review Group which was instrumental in reviewing information, and provided EPA with comments, and local opinions and attitudes throughout the various stages of the

EIS.

The remainder of time was spent hearing and, in most cases, responding to questions and/or comments received from persons attending the hearing. Mr. Hagan called upon Mr. Robert G. Threadgill of the Tennessee Division of Construction Grants and Loans to offer a presentation on behalf of the State. Mr. Threadgill declined, however, saying he had no comments at that time but that the state would submit comments prior to the end of the comment period.

Comments and/or questions were then taken from the floor starting with those persons who had indicated they wished to speak prior to the start of the proceedings. The following is an account of the comment and response portion of the Public Hearing.

Mr. J. R. Wauford, President, J. R. Wauford and Associates: If land application plans and specifications are prepared, are submitted to the State and/or EPA and are approved, the project is built, if later on the wells for surface water monitoring indicate that pollution of either the surface water or the wells is occurring, what will the State and EPA's positions be?

Mr. Robert G. Threadgill, Jr., State of Tennessee: If an alternative system is built, they (EPA) have a policy which is 100 percent payback if the alternative does not work. If, in this case, it does not work and there needs to be some other type of treatment provided, then EPA has a policy in which 100 percent of what is necessary to bring this treatment plant up to meet those effluent standards can be given. It would be 100 percent payback to the Utility District and it would cost the city no more or the Utility District no more money. However, that's only if there's any money available, and the way things have been going in the past few months and in the past year, I'm not sure if there will be any grant monies in the next three or four years. So it's up to the Congress and the new administration on whether there will be any future grant money. So there cannot be 100 percent certainty that there will be that back up money there.

Mr. John E. Hagan: I will just reinterate that the Clean Water Act requires that the EPA essentially put up a word bond that says that if an innovative and alternative system which qualifies for an 85 percent grant, which we believe this facility would, if that facility fails to operate, that EPA is responsible for 100 percent of the cost of replacing it or bringing it up to operational capabilities.

Unidentified Speaker: Is this to say that this is so imprecise a science that you can't go out there and spray something on the ground before the fact, before you spent all that money and dug all those holes?

Mr. Hagan: No sir, I think that this particular technology is not all that imprecise a science. I think that our consultants and Mr. Wauford, all the consultants that have been involved with this project, have agreed that these facilities are designable, operable, and functionable and they will do what they are designed to do. The incentive for this payback was really an incentive to try to get, to try to stimulate, the engineering community. This was passed back in 1977 when the Clean Water Act was amended, and the object of the alternative and innovative incentive money - the 85 percent money, plus the guaranteed payback - was an incentive for the consulting engineering community to try to do things innovative and alternative. I think that this system really has very, very low risk associated with it - very low risk.

Mr. Robert Howard: One thing I might add to that, that there were, I believe, 56 cores taken of the spray irrigation sites and that these cores basically showed that the soils there were very suitable for this kind of land application, which, I think, greatly reduces the potential risk that might be associated with this as an alternative treatment.

Mr. Hagan: Our next speaker was Mr. J. M. Avent.

Mr. J. M. Avent: I don't care to talk at this time.

Mr. Hagan: Dr. Schaefer?

Dr. Arthur M. Schaefer, Provost, University of the South: As far as the University is concerned, we looked at several of these types of sites two years ago, I believe, particularly one pilot project in northern Georgia which was not functioning effectively. On the basis of that visit, we disliked the idea of a facultative lagoon and we urged the EPA to pretreat before spray irrigation which would essentially be, I believe, Alternative 6. Since that time, some representatives of the University have visited other sites and are convinced that the facultative lagoon, if constructed properly and properly operated, is an effective way of doing this and on the basis of that, the University is no longer opposed to that particular suggestion.

Mr. Hagan: Thank you, sir. At this time I'll take comments or questions from the floor. I would ask that you identify yourselves and, if you would, come to the microphone.

Mr. Edmund Kirby-Smith, President, Sewanee Utility District: What I wanted to do was address the same point that Dr. Shaefer did concerning the question of dislike of the facultative lagoon which had been made earlier. As he mentioned there have been visits made to several facultative lagoons in this part of the state which officials of the University and of the Utility District found, I thought, in very good operating condition and as far as the Utility District is concerned, for the record,we would like to say we are in favor of a facultative lagoon. We have found that, in addition to these facilities existing in Tennessee, there are at least several in the Carolinas, one near Clemson College, a number in Mississippi and just recently I received a listing of land treatment facilities which are being constructed by the Corps of Engineers for U.S. Army and Air Force installations in the continental United States. That listed some thirty odd locations at which land application had been installed from the very late 60's through the 70's. Of those locations, I think 6 or 7, spray irrigation was applied to golf courses and had apparently been successful. So the Utility District is in favor of this form of treatment.

Unidentified Speaker: What will the impact of this be upon sewage rates in the county?

Mr. Hagan: If you would refer to the cost table on page 9 of the handout.

Mr. Howard: You should recognize that these costs we'll be giving you are just estimated costs and they could vary up or down depending upon what are the final costs of the system.

Mr. Hagan: The present rate as we understand it, if my information is right, is about $120 a year. Or somewhere in the neighborhood of about $10 a month. The estimate here is that it would go up to approximately $141 a year or approximately $20 a year per service connection more. Now, perhaps you have some more precise information.

Mr. Kirby-Smith: Referring to Table II-10 (Draft EIS) the monthly estimated user cost would be $11.80 at the completion of the proposed project. John Hall, Manager of the Utility District, made some computations based on computer printouts. At current rates, the average bill statistically is about $8.85. That's based on an average consumption of about 5000 gallons per month (refer to table). The figure which he (Mr. Hall) obtained by using the actual billings and the sewage produced was quite close to that figure of 4900, around 4600 to 4700. So, I think at least the statistical average of the customer bill to date is about $8.85 or roughly $3.00 under what the proposal would indicate here.

Mr. Hagan: So an average of about $3.00 a month.

Mr. Kirby-Smith: Now the accuracy and the validity of that would depend upon the accuracy of that $11.80.

Mr. Mikulak: I would use caution on these figures. These were preliminary estimates that were done just the past few months. By the time the facility is constructed and operational the figures that we're talking about to date may be fiction.

Mr. Hagan: I would like to point out though that we're fairly confident of the comparison of the numbers. All of the comparison numbers are subject to the same types of inaccuracies due to inflation. So while they may not be accurate absolute numbers, they are accurate in relative terms. So this is still the least expensive alternative both in project, not quite in project costs, but very close in project costs, but the least cost to the local citizens.

Mr. William Kershner: I have three questions. One, the facultative lagoon sites that have been visited; do they have the same geological type situation that we have here - sandstone, etc.? Two, if the wells are contaminated, what about owners of the property rather than nearby wells? Is there anything in the way of insurance for them? And three, abandoning the STP site, current, will that make any difference as far as money is concerned? How much will we lose on that, or is that taken into consideration in the prices?

Mr. Kirby-Smith: (response to first question) The primary factor is the size of the lagoon. That will be a more appropriate factor to compare with what's proposed here. Lagoons that we visited were in a clay soil that had no need for a lining or a membrane to keep any leakage from occurring. I believe the proposal here is, because of the sandy silty nature of the soil and to avoid any percolation or leaking into the soil strata, that it would be lined. By what means would have to be determined during the design phase. The size of the lagoons that we visited, one was about 10 acres and one was about 15 acres, so they were quite comparable in size to what would be proposed here.

Mr. Kershner: Where were the sites of the ones that you visited?

Mr. Kirby-Smith: In Huntingdon, Tennessee and in Bruceton, Tennessee.

Mr. Hagan: We have some experience in constructing impervious liners in lagoon systems in Florida where you have much more permeable soils than you have up here and they also, in the particular instance that I'm thinking of, build these holding ponds, perhaps, as high as 35 feet above the natural ground level and through compaction of clay material found on the site (the same type of construction techniques they use for building a road; they use the same kind of road building equipment to compact that clay to construct an impervious liner) we've been able to get the permeability of the soil down to extremely small numbers so that for all intents and purposes that is not a permeable soil - I mean its probably less permeable than the concrete floor of this building. So they are very, very tight. The second part of the question that Mr. Kershner had was, will the owners be compensated if their water wells are polluted? I wish I could answer that but I really can't. I don't know what the legalities of that are. I would hesitate to make a legal judgement on that. It would seem to me that the purpose of the monitoring program would be to detect, very early before any wells were contaminated, whether there was any leakage from these ponds. And the location of the monitoring wells is such that they are designed to do exactly that and we would hope that any increase in nitrate levels in the groundwater would be detected long before it got to any drinking water wells. How far is the nearest drinking water well, Ron?

Mr. Mikulak: Well, I'm not sure. Most of the people in Sewanee are served by the Sewanee Utility District water supply and because of, what I understand, the high iron content of groundwater, it's not used very much as a drinking water source. Another reason its not used very much is because of the accessability of the water mains for the Utility District.

Mr. Howard: I wanted to ask Mr. Kershner whether or not he actually is on a groundwater well for your water supply?

Mr. Kershner: No, I'm on city water. I was thinking about the people over in Garnerstown and that area. There are a number of wells there...

Mr. Kirby-Smith: I think the Garnerstown site is that area which is between the Garnerstown loop road and the entrance to St. Marys. That area is included in one large drainage basin. I would think that because of the natural topography and the natural flow of water that it would be most unlikely that there would be any flow other than towards the escarpment towards the bluff line.

Mr. Howard: If you look at the figure on page 11 (of the handout) you can see by the drainage basin and where the streams are that the particular area located between the St. Mary's spray irrigation site and the Garnerstown spray site would, just by looking at the topography and the layout, that one would be led to believe that it is an isolated area. Because there is a ravine immediately north of it and if you look at the drainage basin from the Garnerstown site, it would be draining south, away from that particular area.

Mr. Hagan: And the other question was, would there be any loss from abandoning the existing treatment plant? Is there any outstanding indebtedness on the existing treatment facility?

Mr. John E. Hall: No.

Mr. Hagan: Mr. Hall says there is no outstanding indebtedness.

Mr. Henry Ariail: I'd like Mr. Mikulak to clear up a point that I'm confused about. The diagram shows that the existing treatment plant is to be abandoned and yet in the verbal description there is to be some pretreatment to go on that site.

Mr. Mikulak: The existing treatment plant site would still serve as the focus point for the wastewater. Pumps are there; its a good collection point.

Mr. Ariail: Would odors eminate from the pretreatment system or would it be all in pipes just passing from there on to the new lagoon site?

Mr. Howard: That would be based somewhat on the design. There has been some discussion already with the 201 consultant or a consultant who might very well be involved in this. There has been some discussion as to whether or not there might be an equalization basin and whether or not there might be any need for any aeration of the wastewater at that site. Some of the preliminary discussions we've had so far indicate that there likely would not be; that it would be unnecessary. I think that based on the design, there are a number of ways that even if there was an equilization basin and there was aeration at that site that aesthetic problems associated with that particular operation would be taken care of.

Mr. Hagan: In other words, it would just be a pumping station.

Mr. Mikulak: What's your experience now with odors at the facility. I know where you live.

Mr. Ariail: The treatment plant and I are close friends, geographically, but we're not such close friends odoriphically. Sometimes it's quite noticeable.

Mr. Wauford: We're in basic agreement with the engineering concept. We don't have any problems with that. From our own observations, we doubt that the odor problems...as a matter of fact, we don't see any great, real risk involved. There's always some risk or the government wouldn't underwrite the cost of fixing things up if they go wrong and that's the reason I asked my first question to get it in the record. Well, I'll ask another question. I was hopeful that I knew the answer to the first question and I really wanted the EPA to get their answer in the records, which Mr. Hagan did. This question concerns the I/A eligibility aspect. In other innovative and alternative projects in which we've been involved, each component has been analyzed by your I/A section and considered as to whether or not that particular component is innovative or not, such as the pumping station to convey the sewage from the existing site, and the force main, and the grit chamber, in other instances have been considered to be not innovative, but conventional treatment. Facultative lagoons, of course, are not, per se, innovative. Are there any components in this system, which would not qualify for 85 percent funding? I didn't notice their being identified in the cost-effective analysis if there were.

Mr. Hagan: The answer that I give you is going to have to be a bureaucratic answer because, frankly, we don't know. At this point, the alternative and innovative determination is made by our Construction Grants Office in Atlanta and, I assume, perhaps in conjunction with the Construction Grants Office in the State of Tennessee. And it's my understanding that the evaluation is made on a component-by-component basis. I can not frankly, in my own engineering judgement see that a grit chamber or a pumping station is very innovative or alternative, however, I think probably the treatment processes, and the sprayfields are either innovative or alternative. Certainly in other areas spray irrigation sites have qualified as innovative and alternative technology. On the facultative lagoons, I have no personal knowledge of that so I won't try to answer it. I think the actual answer to your question is that it will have to be determined on a component-by-component basis.

Mr. Howard: We will attempt to give an answer to your question in the Final EIS.

Mr. Threadgill: The only thing I can add to that is the likelihood that the lagoon itself - the facultative lagoon - will be considered part of the spray irrigation system and will receive the 85 percent funding. That has happened in the past on other projects, so the only problem we might have is the pumping station itself and maybe the preliminary treatment given prior to going to the lagoon. These may be considered non-eligible for the 85 percent grant and would just receive the 75 percent grant.

Mr. Hagan: Are there any more comments or questions from the floor?

Dr. Schaefer: Would you describe for us how the appraisal procedure would take place for the land?

Mr. Mikulak: It's an area I am not very familiar with; it's not part of the activity I am involved with. But, I did a little of my own work and I can give you a general idea of how the whole situation is approached when we're talking about land appraisal and acquisition of land. It's something that is basically a matter between the grantee, in this case the Utility District, and the land owner or the land leasor. There are procedures that are in place; they are guided by regulations that EPA has come up with in response to federal law. The procedures are very straightforward. I don't think I'll go through each procedure step-by-step here. I made a copy of the policy procedures available to the Utility District. Anyone who's interested, I have a copy here, if someone wants to review it. If you wish to get a copy of these procedures, I'll certainly be happy to mail you a copy. The matter of land appraisal, again, is between the grantee and the land owner, with EPA looking over everybody's shoulder because we're paying for 85 or 75 percent of the activity. It's a matter in which one, two or three appraisers are contracted with; the fair market value of the home or the land is thrown out for entertainment; there is negotiation involved. When a number has been decided upon between the grantee and the landowner, EPA approval is sought, hopefully obtained, and we're all home free, so to speak. Again, there is a matter of public notice involved, public notice of land acquisition and then land appraisal. The home owners or the affected residences or affected parties have to be made knowledgeable of what the project is, what the impact might be on themselves and they have every opportunity to obtain a fair market value for their properties. That's just a very general overview; it's a fairly common-sense approach and believe it or not there are some federal procedures and regulations that do come from a common-sense approach, and hopefully everyone is treated fairly; that's the intent of the regulations and procedures. If people are not treated fairly, I'm certain that there are measures available - EPA probably wouldn't approve the whole thing if everybody wasn't happy and, like I said, I'll leave a copy of these procedures available here and if anyone is interested for more detail, please get in touch with me and I'll provide you with what I can.

Mr. Hagan: We had the opportunity this afternoon to walk through some of your beautiful woods. We went down to Peters Cave and Buggytop and also walked over a portion of the Garnerstown spray site. The proposal as I understand it is for a 200 foot wide buffer to be left essentially intact. All the trees and all the underbrush and everything are to be left just like they are, except for the necessary access roads and piping corridors and that sort of thing. My response to this land issue is, and in response to Mr. Wauford's question about what is the risk of a spray irrigation site, I think really the only risk you're going to have is that you're going to forget that its there. With a 200 foot buffer strip around it, the people that live in those houses adjacent to that site are not even going to know the thing's there and nobody else is ever going to know the thing's there, and the risk of that is that you'll forget to maintain it. You'll just never know the thing is there.

Mr. Howard: I'd like to add one thing regarding those procedures and I think it's a key part of the process. The process is designed to inform the people who are likely to be affected by the regulations of what the procedures are, and that there is a dialogue which is mandated by the regulations so that everyone is kept informed. It's designed to be a fair process to both parties, that is to the applicant and to the person who might be affected.

Mr. Howard: Are there any other comments or questions from the floor?

Mr. Wauford: What are the procedures for the applicant to follow, to most expeditiously get to the money, so to speak?

Mr. Hagan: I think I can give you that procedure in a series of fairly large groupings of steps. I wouldn't want to try to lay out a detailed procedure, particularly not just off the top of my head, but the next step in this process is to complete the Final EIS which should be done before the end of the calendar year. Upon completion of the Final EIS, EPA would procede to authorize additional Step 1 grant funding (that would have to be applied for) to update the 201 Facilities Plan to bring the Facilities Plan in conformance with the EIS, if that step is necessary. I would suspect then that you would apply immediately for a Step 2 design grant which depending on your placement on the State's priority list, would be funded when that floated to the top of the list. Then immediately following completion of the design, you would either apply for a Step 3 grant or, as Mr. Threadgill has suggested, perhaps apply for a combination Step 2-3 design and construction grant in one operation. For a project of this size, I think that would probably be an advisable way to go.

Mr. Howard: Certainly the key factor here is where, after the EIS is completed, does this particular project lie on the State's priority list, and that is a matter that the State sets with all of the various projects that they have to fund within the State of Tennessee; they establish priorities with the available monies, and go down the list and wherever the money runs out, that's where the projects run out. I think that the question probably is more appropriately addressed to discuss that further with the State at another date.

Mr. Wauford: The thing I was driving at is whether any extensive revisions to the 201 Plan would be necessary or whether a one or two page resolution saying the EIS is accepted, adopted, and approved would be sufficient?

Mr. Hagan: Well, again, I think you'd need to talk to the State of Tennessee and to EPA's construction grants people as to what they will be willing to accept along that line. I really can't answer that Mr. Wauford, I wish I could. In some other relatively complex projects, we have had to go back and update the 201 Plan. It may not be necessary.

Mr. Hagan: If there are no other comments I just want to thank you all for coming tonight and participating in this. This has been a very good, lively discussion. I would reinterate that our comment period will be open until October the 30th. If anyone wishes to submit written comments for the record they will be considered as if they had been presented tonight. A summary transcript of this Hearing will appear in the Final EIS. We will try to answer all the questions that we were not able to get specific answers for tonight and those answers will appear in the Final EIS. The Final EIS will be out before the end of this calendar year and it will be made available to those who are on the mailing list or who indicated on the registration card tonight that they wished to receive a copy. So, if there are no other comments, I'll declare this meeting adjourned. Thank you.

VII. WRITTEN COMMENTS RECEIVED ON THE DRAFT EIS

This section includes all those letters received from persons commenting on the Draft EIS. These persons or agencies are listed in Section IV. Part A. of this document.

J. R. WAUFORD & COMPANY
Consulting Engineers

P. O. BOX 140350 — 2835 LEBANON ROAD • (615) 883-3243
NASHVILLE, TENNESSEE 37214

September 16, 1981

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
EPA, Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Re: Draft and Environmental
Impact Statement
Sewanee, Tennessee

Dear Mr. Hagan:

We are the Consulting Engineers for the Sewanee Utility District and have reviewed the copy of the Draft and Environmental Impact Statement received together with your "Notice of Public Hearing", dated August 31, 1981.

First, allow us to compliment you and your consultants on the quality of work performed and generally upon the conclusions reached. Secondly, we offer one comment and that is if the selected plan is used, we would probably want to design a sewage pumping station at the existing treatment plant which would provide for sewage pumps to handle normal flow and stormwater pumps to handle peak I/I conditions; this would require a separate force main and would utilize the freeboard on the facultative lagoon for 500,000 gallons of inflow storage.

Thirdly, we would appreciate an opportunity to review the detailed design criteria used for the sewage pumping station, force main, facultative lagoon and any lines, land application area and application system and laboratory and control building. If we might review these prior to the October 20 public hearing, we would appreciate such consideration.

Yours very truly,

J. R. WAUFORD & COMPANY
CONSULTING ENGINEERS, INC.

J. Roy Wauford, Jr., P.E.
President

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JRW:lld

cc: Gannett, Fleming, Cordday, Carpenter
Consulting Engineers
John Hall, Manager, Smith Utility District

VII-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: OCT 2 1981

SUBJECT:
Sewanee, Tennessee EIS

FROM:
Acting Chief, SC/TN Facilities Planning Section
Water Quality Management Branch

TO:
Ron Mikulak, Project Officer
EIS Branch

1. The EIS should include some discussion on the ability of the users of the system to pay for it. This should include more detail on existing debts, how and for how long they are paid, alternative sources of funds and mechanisms available for financing the local share. Tables II-10 and III-2 should include data on the percentage of median household income used to pay for the various alternatives. Proposed user charges should be thoroughly discussed at the public hearings on the draft EIS.

2. The population and per capita flows appear reasonable, however, there must be some justification for assuming all flow is received within 18 hours. Will 100% of the population in the subbasins listed in Table II-1 be served?

3. The need for and cost-effectiveness of a 497,000 gallon equalization basin must be shown. Generally, for small land systems a storage and preliminary treatment function is accomplished with one pond. The storage requirement should be based on the period of time that the site is unsuitable for spraying or on mechanical reliability.

4. The cost-effectiveness analysis has not been completed strictly in accordance with the construction grant regulations (i.e. land can be appreciated at 3% per year); however, our calculations based on the EIS's raw capital and O&M costs support the selection of Alternative 7.

Leonard W. Nowak

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EPA Form 1320-6 (Rev. 3-76)

United States
Department of
Agriculture

Soil
Conservation
Service

675 U. S. Courthouse
Nashville, Tennessee 37203

October 15, 1981

John E. Hagan III, P.E., Chief
EIS Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan:

We have reviewed with considerable interest the Draft Environmental Impact Statement for the Sewanee, Tennessee Wastewater Facilities as well as the technical reference documents, Volumes I and II. We have several concerns with some of the information contained in the documents, and the conclusions that have resulted from this data.

The draft Alternative Development and Evaluation Technical Reference document (Volume II) contains a report prepared by Soil Systems, Inc. The report follows Page IV-39 in the draft document. Page two of the report describes the subsurface conditions of one of the sites as follows: "At the St. Mary's site, the depth to refusal varied from 2.2 feet to 21.2 feet. Generally the upper 2 to 8 feet of the boring was easily penetrated by the augar at which point drilling resistence increased steadily until refusal was reached. The soils encountered were generally silty sands to sandy silts. All borings reached refusal in the sandstone unit."

The document also includes a Site Evaluation for Proposed Forest Spray Irrigation System report prepared by, Gannett, Fleming, Corddry and Carpenter, Inc. The report can be found immediately following the report of Soil Systems, Inc. Page four of the report states: "Typical profiles as described in the 1958 Soil Conservation Service Soil Survey are given in Table I. The actual soil profiles were much deeper (in some cases, over 20 feet) on the three sites evaluated as indicated in the SSI report." While the report states that the soil profiles were much deeper than the profiles described by SCS, the report containes no description of these deeper profiles. If indeed, the deeper soil profiles do exist, then these profiles should be described in the report. The report concludes that the depth of the soil profile is equal to the depth of material than can be penetrated by a power augar. This is not consistent with Soil Conservation Service procedures for determining soil depth. The report prepared by Gannett, Fleming, Corddry and Carpenter, Inc., also contains an analysis of the storage capacity and percolation of the soils to a depth of 24 to 27 inches. The report, however, does not address the percolation rate of the substratum, nor the storage capacity that can be anticipated under field conditions during different seasons of the year. This needs to be done in order that actual storage volumns available on the site can be determined.

Page IV-65, the Draft Environmental Impact Statement reads as follows: "The major soil impact will be through soil erosion during construction, this impact can be reduced by:

1. Limiting the size of the pipeline corridor to the minimum possible area of disturbance.
2. Prepare and strictly enforce construction plans which require the rapid stabilization and revegetation of construction areas.
3. Institute best management controls in order to reduce the amount of non point source runoff from the construction sites."

The report does not contain an analysis of the anticipated impacts of the sprayed wastewater on either the existing vegetation or the soils. These evaluations need to be included in the report.

We appreciate the opportunity to comment on the Draft Environmental Statement. I trust these comments will be helpful in preparing the Final Environmental Impact Statement and designs for the Sewanee, Tennessee Wastewater Facilities. If we can be of further assistance, please let us know.

Donald C Bivens

Donald C. Bivens
State Conservationist

cc: Norman A. Berg, Chief, SCS, Washington, D.C.

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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta, Georgia 30333

(404) 262-6649

October 26, 1981

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan:

We have reviewed the Draft Environmental Impact Statement (EIS) for the proposed Sewanee Wastewater Facilities for the Town of Sewanee, the University of the South, and the surrounding areas of Franklin County, Tennessee. We are responding on behalf of the Public Health Service and are offering the following comments for your consideration in preparing the Final EIS.

In general, implementation of the preferred alternative should have a positive effect on current wastewater treatment facilities and programs and should result in enhanced environmental quality and public health. Nevertheless, it is important that the proposed monitoring program be performed in the future to assure protection of groundwater and surface water resources. The effect that large and/or long-term storm events will have upon the management and operation of the spray fields should be discussed. What measures will be incorporated into the design and operation of the lagoon to prevent field spraying during frozen and/or saturated soil conditions?

It has been our experience that poor management of a spray irrigation field may lead to potential runoff and water quality problems. For this reason, the EIS should discuss the management aspects of maintaining necessary percolation and infiltration rates, suitable soil conditions and vegetative cover, and preventing surface compaction, clogging and matting.

For general protection of public health and safety, will the lagoon and spray irrigation areas be posted and fenced?

The potential vector problems that may be associated with the operation and maintenance of the lagoon and spray fields should be addressed. The wastewater treatment systems should be operated in such a manner to prevent the increase of any vector populations that have the potential to cause vector-borne disease or nuisance problems. We suggest that you contact the local and/or State public health authorities for information on vector problems and control techniques in the project area.

We appreciate the opportunity to review this Draft EIS. Please send us one copy of the final document when it becomes available. Should you have any questions about our comments, please call Robert Kay of my staff at FTS 236-6649.

Sincerely yours,

Frank S. Lisella

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

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October 29, 1981

John E. Hagan, III, P.E.
Chief, EIS Branch
U. S. Environmental Protection
Agency
Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

Re: Sewanee, Tennessee Environmental Impact Statement

Dear Mr. Hagan:

This letter is on behalf of the Sisterhood of St. Mary, Sewanee, Tennessee, whom we represent in connection with the above matter.

For the reasons indicated below, our client is strongly opposed to Proposal No. 7 contained in the recent study by your agency of the wastewater problem in the community of Sewanee. It is our understanding that comments on the various proposals will be considered by your agency, and we are pleased to have this opportunity to advise you of our client's reaction.

If Proposal No. 7 is followed (listed in your study as Alternative No. 7) our client would be adversely affected. This understandably concerns our client whose primary interest is the continuation of its convent and retreat center in a manner and atmosphere which is compatible with its purposes.

Among the reasons why Proposal No. 7 is unacceptable to our client are the following:

The information concerning land ownership in the documentation is deceptive as it fails to reflect that land immediately adjacent is already developed with privately owned residences in the drainage area of the lagoon and spray installations. A pasture owned by our client, where cattle (which are raised for food) graze, has a pond which would receive water from the proposed well and spray areas. In general, the proximity of the site proposed as No. 7 and the anticipated adverse effects would not be compatible with our client's established program at Sewanee.

Since there are obviously other alternatives to Proposal No. 7, we respectfully request that Proposal No. 7 be rejected and that attention then be given to more appropriate ways to elminating the wastewater problem, particularly those which would have less impact on the Sisterhood of St. Mary.

We shall appreciate your keeping us advised of any developments.

Yours very truly,

GULLETT, SANFORD & ROBINSON

Jack W. Robinson

JWR/jc

cc: Sisterhood of St. Mary

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DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

IN REPLY REFER TO

ORNED-P

29 OCT 1981

Mr. John E. Hagan III, PE Chief,
EIS Branch
EPA, Region IV
345 Courtland Street, NE
Atlanta, GA 30365

Dear Mr. Hagan:

I received the Draft EIS Sewanee, Tennessee, Wastewater Facilities, and submit the following comments for your consideration:

a. The preferred alternative waste treatment system, Alternative 7, involves replacing the existing STP with a combination storage pond/facultative lagoon with pretreated effluent spray irrigated at sites approximately 3000 feet west of the existing STP. Reference should be made to the holding capacity of the system during winter freeze conditions and in the event that maintenance is required.

b. Page II-7. Overland flow is considered unmanageable because of the sloping terrain, however, some of the terrain is within the 9% slope limitation according to Table A-2a.

c. Page II-19, II-20. Table II-4 and II-5 footnotes refer to Table IV-4 for information on spray/sites. Table IV-4 lists cultural sites in the area.

d. Page III-3. Land Application Sites, paragraph 2, lines 3, 4, 5. Same as b above.

e. Page IV. Reference to the detailed soil survey should be supplemented by data indicating the suitability of the soils for spray irrigation.

f. Page IV. Odor, paragraph 3 was an aerobic lagoon considered? Aerators could be added to reduce odor.

g. Page IV-1. Under NEPA Guidelines Section 1502.15, the experience of the preparers should be included.

h. Page A-10. The table heading is Overland Flow Spray Irrigation, is this correct?

I appreciate this opportunity for review and comment.

Sincerely,

E. C. MOORE
Chief, Engineering Division
For

ENVIRONMENTAL IMPACT STATEMENT
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United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / Suite 1412 / Atlanta, Ga. 30303
Richard B. Russell Federal Building
75 Spring Street, S. W.

ER-81/1957 October 30, 1981

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
EPA, Region 4
245 Courtland Street, NE
Atlanta, Georgia 30365

Dear Sir:

We have reviewed the draft environmental statement for wastewater facility at Sewanee, Franklin County, Tennessee, and have the following comments.

General Comments

We suggest that the analysis of potential impacts of land application by spray-irrigation methods should include more adequate consideration of the fate of nitrates and any other constituents little affected by traveling a short distance through soils. The type(s) of crops under consideration for the irrigated areas should be assessed for their nitrate uptake capacity, if this is fundamental to the plan. The fate of effluent that reaches the resistent sandstone should be discussed; presumably it would move downgradient along the top of the sandstone. A map showing sufficient geologic detail to permit assessment of the possibility of effluent seepage to drainage courses should be included.

A specific omission regarding endangered species has been noted and the following related comments are recommended for inclusion in the Department of the Interior's response. Although the DEIS addresses endangered species, it does not address how Section 7 obligations are being fulfilled. A list of endangered and threatened species were provided to Claude Terry and Associates, Inc., by letter of January 12, 1981, with a copy to EPA, Atlanta, Georgia, pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended. Under the provisions of Section 7(c), Federal agencies have 180 days to complete a biological assessment for the species provided in the list furnished by the Fish and Wildlife Service. To date the Fish and Wildlife Service has not received a completed biological assessment or been advised as to completion of the biological assessment. The January 12, 1981, letter provided an outline of information that should be obtained in the biological assessment. Once the biological assessment is completed, the Federal agency must determine if the proposed activities (alternatives in the DEIS) may affect listed or proposed species and initiate consultation with the Area Manager, U.S. Fish and Wildlife Service, Asheville, North Carolina, if a determination of "may affect" is made.

It should be pointed out that positive as well as adverse affects require consultation. In reviewing the DEIS, a conclusion of beneficial "may affect" seems to have been made regarding at least one mussel species, thus indicating the need for initiating consultation.

Although the document includes an extensive listing of area historic and cultural resources, there is no discussion of the significance of the resources or the effect on the resources of the various alternatives. We request that the State Historic Preservation Officer (SHPO) be consulted concerning the survey for, and evaluation of, cultural resources in the project area. A letter documenting that consultation should be included in the final statement.

The proposed project will not adversely affect any existing, proposed, or known potential units of the National Park System.

Specific Comments

On page IV-54, the statement mentions that tentative main routes for Alternatives 3 and 4 could result in negative impacts to historic sites. Should either of these alternatives be selected, we suggest close consultation with the SHPO to mitigate any negative impacts.

The St. Mary's spray site, utilized for the preferred alternative (7), is adjacent to an existing Civil War overlook. We suggest close consultation with the SHPO to minimize effect. The St. Mary's spray site is also within 1 mile of the Barnes Branch of Lost Cove, an area listed on page IV-33 as containing popular swimming holes. The statement suggests that the wooded nature of the St. Mary's site will prevent the occurrence of airborne pathogens. We suggest that the area be monitored to assure that airborne or water-carried pathogens do not reach this adjacent recreation area.

Thank you for the opportunity to comment on this draft Environmental Impact Statement.

Sincerely,

James H. Lee

James H. Lee
Regional Environmental Officer

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TENNESSEE
KARST RESEARCH

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(615) 834-2757

November 17, 1981

Mr. John E. Hagan III, P.E., Chief
EIS Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan,

Please forgive the tardiness of my reply, but I found little of substance to comment on in this well-prepared Environmental Impact Statement. We certainly support the land treatment option for Sewanee.

One point of minor concern might be the disposal of potentially toxic materials by the University of the South's chemistry and biology departments into lab sinks. However, this should not have any effect on the chosen option.

Those areas of specific intrest to us, karst resources, were treated in an unusually lucid and proffesional manner.

Thank you again for the opportunity to review this EIS.

Sincerely yours,

Brad Neff

Brad Neff
Associate Director

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VIII. LIST OF PREPARERS

Project Personnel

The following is a listing of those EPA officials responsible for the evaluation of the Sewanee, TN EIS prior to its approval, and also responsible for the scope and contents of the EIS.

Also listed below are the consultants responsible for preparation of the EIS and background documents. Included are their project title, education and technical expertise.

U.S. Environmental Protection Agency

Robert B. Howard	Chief, EIS Preparation Section
Eugene Raybuck	EIS Project Officer
Ronald J. Mikulak	EIS Project Officer

Consultants

Gannett Fleming Corddry and Carpenter, Inc.

Thomas M. Bachford B.S., 1964, Civil Engineering M.S., 1966, Civil Engineering Ph.D., 1972, Civil Engineering	Senior Project Manager Technical Specialties - Management, Water Resources and Planning, Environmental Engineering
Richard W. Koch B.A., 1965, Political Science M.R.P., 1972, Regional Planning	Project Manager Technical Specialties - Management, Environmental Planning, Public Administration, Public Participation
Lynette J. Deuel B.A., 1979, Geoenvironmental Studies Graduate Studies, 1980-1981, Urban Planning/Environmental Pollution Control	Environmental Scientist Technical Specialties - Environmental Planning, Environmental Science
Andre DeGeorges B.A., 1970, Biology M.S., 1973, Fisheries/Aquatic Biology	Environmental Scientist Technical Specialties - Aquatic Biology, Fisheries, Environmental Science
Jeffrey G. Wendle B.S., 1971, Civil Engineering	Project Engineer Technical Specialties - Water

M.S., 1977, Environmental Engineering	Resources Engineering, Facilities Planning, Operator Training
Marintha A. Kimport B.S., 1976, Civil Engineering/ Engineering and Public Affairs Graduate Studies, 1980-1981, Civil Engineering	Assistant Project Engineer Technical Specialties - Water Resources Engineering, Computer Modeling Applications

Claude Terry and Associates, Inc.

Claude E. Terry B.A., 1960, Biology M.S., 1962, Microbiology Ph.D., 1965, Microbiology	Project Executive Technical Specialties - Managemen Biology, Microbiology, Public Participation
Robert J. Hunter B.S., 1974, Biology M.S., 1978, Biology	Project Manager Technical Specialties - Managemen Biology
James C. Hodges B.S., 1975, Biology M.S., 1979, Biology	Environmental Scientist Technical Specialty - Aquatic Biology
Thomas C. Mather B.S., 1978, Human Ecology Studies, Two years, Environmental Design	Environmental Scientist Technical Specialties - Ecology, Botany, Environmental Design
Anita M. Patterson B.S., 1970, Chemistry M.A.T., 1973, Chemistry	Environmental Scientist Technical Specialties - Water and Wastewater Analysis, Appropriate Energy Technology
Louise B. Franklin B.A., 1961, History M.A., 1977, City Planning	Environmental Planner Technical Specialties - Managemen Environmental Planning, Energy Management

Consultants

Soil Systems, Inc. 525 Webb Industrial Drive Marietta, GA 30062	Soil Borings
Dr. William E. Sopper 416 Outer Drive State College, PA 16801	Land Treatment Analysis